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VOL. CXII., No. 18
WHOLE No. 3243

NEW YORK, SATURDAY, MAY 1, 1920

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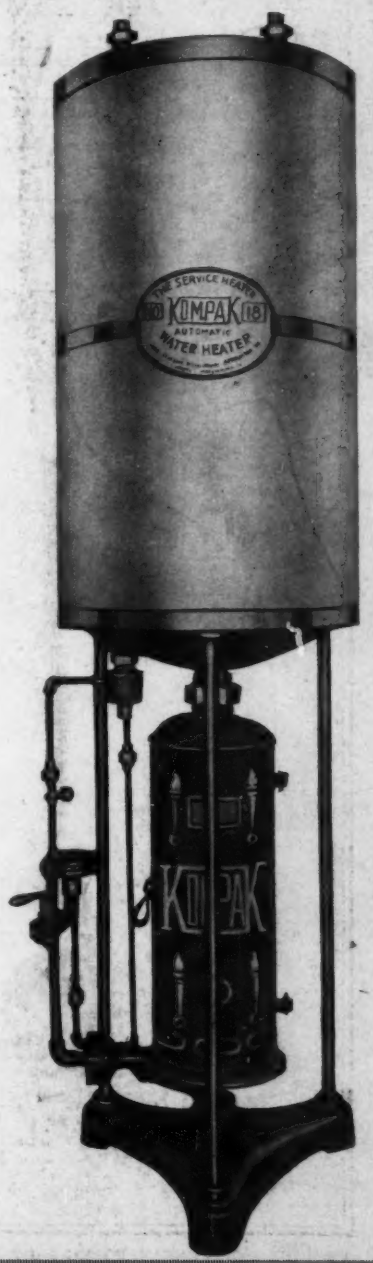

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INDEX TO CONTENTS, PAGE 345

ADVERTISERS' INDEX, PAGE 24

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Vol. CXII, No. 18 NEW YORK, MAY 1, 1920 Whole No. 3243

Mixture of Benzol, Xylol, Toluol and Gasoline, Properly Made Far Superior as Motor Fuel to Ordinary Run of Gasoline

Establishing a Market the Task Ahead for Gas Companies in Putting Light Oil Recovery Plants on a Paying Basis—A High B.t.u. Standard an Obstacle to Motor Fuel Production

By R. E. KRUEGER

Rochester Gas & Electric Corporation, Rochester, N. Y.

The possibilities of using mixtures of benzol, toluol, xylol and solvent naphtha as a motor fuel are tremendous, and there are no great secrets connected with the manufacture of a synthetic motor fuel of this nature.

A great many light oil recovery plants in this country have been closed down since the signing of the armistice in October, 1918, due to the fact that there is no market for light oil. In most cases, except where a high British thermal unit water gas is required, these abandoned plants can be put on a paying basis, if a market can be established for synthetic motor fuel.

With these things particularly in mind, it seems to me a great service can be rendered by men who are actually in this new phase of by-product recovery and refining, and that service is merely this: To come out and relate their experiences in the development of this industry and help the other fellow who may be less fortunately situated. Usually industry does not gain a tremendous amount of good out of a few secret processes. A much greater advance is made when men get together and relate to each other their experiences.

In this article, then, I am going to try to give my experiences in the manufacture and sale of motor fuel. I am going to try to cover manufacture as well as the sales end, because I believe that a synthetic motor fuel of a mixture of benzol, xylol and toluol and gasoline, if made correctly is so far superior to the ordinary run of gasoline, that as far as the sales end of the game is concerned we may as well call in the salesmen from the field, for motor fuel can take care of itself for the rest of the inning.

The Manufacture

It is pretty generally known how—what we call light oil—is recovered from the gas. By this I mean that those in the gas and oil business and a certain set of technical men know how this commodity is recovered, but the public at large have a very poor idea how the material is obtained. A great many have the idea that because it is made by a gas company it cannot be good anyway, and that it must have a set of physical characteristics akin to that black, sticky, "nasty" coal tar that they have seen or smelled on someone going home from a gas plant, and naturally they will have nothing to do with it. Then, too, they get the idea that it is made of those foul-smelling drips that the man pumps from the gas mains in various parts of the city.

If someone writing for popular periodicals would sit down and write a series of articles on the gas business and by-product recovery and refining, I believe it would do the industry a lot of good.

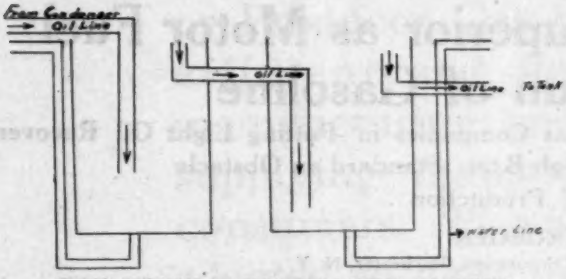
In the case of motor fuel the public is our customer, and motor fuel is looked upon by the public with suspicion, because knowing nothing about it and having never heard anything about it, it believes that someone is trying to sell them a white elephant and a great many of them have been saturated with white elephants in the form of gold bricks, silver mines, oil geysers and colors of the Mexican rainbow to such an extent that they are immune to any flock of white elephants that might happen to come their way. So the first thing to do is to give the public some idea of what you are selling them; tell them how light oil is recovered, what it is and how motor fuel is made from it. Those of us who are in the industry and know any organic chemistry at all are perfectly aware that a great deal more is known about the constituents of motor fuel than about the constituents of a gasoline.

Not Absolutely Necessary to Use Straw Oil

Under the head of crude light oil there are two or three things which might be brought out that have a direct bearing on motor fuel. It is not absolutely necessary by any means to use straw oil as an absorbing oil in the light oil recovery plant. Ordinary gas oil, such as is commonly used in water gas machines answers the purpose very well and is usually much cheaper. A good grade of ordinary water gas tar can also be used, if care is taken to keep the viscosity down.

After oil tar has passed through the crude still several times, it becomes viscous and later on rather resinous, so that the entire circulating system of a continuous light oil plant may become plugged with this material. Oil tar or water gas tar can be used to good advantage if proper care is exercised. Either gas oil or water gas tar will cut down the cost per gallon of light oil recovery considerably.

The light oil plant should be so designed and operated that a good, clean light oil is produced at all times. The chief thing that produces "dirty" light oil is the wash oil or absorbent oil that is being circulated. After the light oil has once been separated from the wash oil, care should be taken to keep them separated from then on. The best way to do this is to watch the secondary decanters carefully. The pumps that handle wash oil ought not to handle crude light oil also. This point in regard to clean light oil is of importance, because a light oil contaminated with wash oil is, in the first place, hard to wash with sulphuric acid and secondly, the presence of wash oil cuts down the recovery of rectified light oil from the washed light oil. The points made about cover my experience, outside of the ordinary routine of light oil recovery with which all are familiar.



CROSS-SECTION OF TWO DECANTERS IN SERIES

Purification of Crude Light Oil

I believe some companies fractionate their crude light oil before they wash it with sulphuric acid. I have never had any experience in this way of handling crude light oil, but am inclined to believe that the preliminary fractionation is expensive and unnecessary. We have always washed the crude light oil just as it comes from the crude still and we have experienced no difficulties and have not had to install a still for the preliminary fractionation. The crude light oil is put into an open top lead-lined agitator of about 2,000-gallon capacity, and usually this batch is warmed with exhaust steam to about 40 deg. Cent., and then the sulphuric acid is run in by gravity while the oil is agitated, either by air under pressure or by means of a centrifugal pump in a circulating system. The oil and acid mixture heat up, due to the action of the sulphuric acid on the oil, and the mixture goes through a variety of color changes ranging from yellow to blue. About 30 gallons of crude concentrated sulphuric acid are usually run in and this mixture agitated for about thirty minutes. The temperature may rise as high as 55 to 60 deg. Cent. during this period. Usually great volumes of sulphur dioxide are evolved from this mixture, so it is necessary to have the agitator in a well ventilated room. A sample of the mixture is then taken to the laboratory and the sludge and any free acid which settles to the bottom drawn off by means of a separatory funnel and the discarded oil is neutralized with an excess of alkali (usually sodium hydroxide) and a portion of this oil is fractionated and a color test run on the fraction below 150 deg. Cent. The purpose of the color test being to find out whether the oil has been washed clean of impurities. The color test is run as follows:

A portion of the fraction below 150 deg. Cent. is filtered through ordinary filter paper to remove any suspended water of which there is always some present, then a portion of this filtered oil is carefully poured into one-fifth of its volume of pure concentrated sulphuric acid in a small French square bottle. The bottle is stoppered with its glass stopper and shaken fifteen seconds and allowed to settle. The sulphuric acid in the bottom of the bottle will be colored and the intensity of the color is a measure of the amount of foreign material still left in the sample of oil tested. Usually a standard set of colors ranging from No. 1 to No. 15 is made up and then one of these standards is set as a limit. A test then which shows a color darker than the limit color means that the batch of which the test is a sample will have to be washed more. On the other hand, if the test has a color lighter in shade than the limit color the batch has been washed enough.

The batch is allowed to settle for about fifteen minutes. The sludge that settles out is usually of two layers: a fairly thick, heavy layer, composed of partly unused sulphuric acid which has changed color considerably, and on top of that there is a thicker spongy mass consisting of the true sludge which is a direct result of the action of the acid on the oil. We run the first portion of this sludge into a receiving tank and the second portion is discarded.

After this has been done the batch of oil is washed two or three times with batches of water of 100 gallons, each so as to remove as much of the free sulphuric acid as possible, also to wash down any sludge that may adhere to the sides of the agitator. Great care should be exercised in this water washing, for the reason that emulsification takes place very readily.

These water washes are followed by the alkali wash. We take the waste alkali from the previous wash, titrate it to find out how much available alkali it still has in it and add enough new alkali to it so that it will finally be in the proportion of 120 lbs. of alkali per 100 gallons of water. This is heated to boiling and then passed into the acid washed oil by means of compressed air. Agitation starts in the agitator as soon as any alkali comes over. Usually fifteen to thirty minutes agitation are necessary to neutralize all the acid present in the batch of oil.

About ten minutes after the batch has become a nice yellow color, due to the action of the alkali, a sample of the batch is taken to the laboratory, washed with water in a separatory funnel, and a portion of the sample distilled. This distillate below 150 deg. Cent. is shaken with about 20 c.c. of distilled water, and the water is drawn off into a small beaker and one drop of methyl red added. A red or pink color indicates acid, which means that the batch will have to be agitated more. If a yellow color appears upon the introduction of methyl red, the batch has been agitated enough. I might say here that methyl red is a very sensitive indi-

(*Continued on page* 348.)

Would Remove Control of Commissions Over Rates Charged Industrial Users

Morse Dellplain Argues That This Is a Competitive Business That Will Remain with the Gas Companies as Long as It Suits the Purchasers to Buy from Them, and That Leaves Purchasers Full Independence to Shift Away When It Suits Them

Director-General Hines, in the course of an address at a farewell dinner given to his assistants, made this statement:

"If the Railroad Administration had been able to raise its prices as quickly as other industries could to meet the rapidly advancing costs, there would have been no loss but an actual profit in operation of the roads for the first year and ten months of Government control."

From the standpoint of public utility executives, this statement by a Government official is very significant, and the question naturally arises, why should not the railroads have been able to raise their prices in time to meet the rapidly advancing cost? asked Morse Dellplain, in a paper at the Indiana Gas Association convention. All rules of sound economics, as well as the Constitution of the United States, provide that no legitimate business shall be done at a loss, and any governmental policy which makes it necessary for business to be conducted at a loss is a policy which must eventually lead to the demoralization of industry.

A Reluctance to Meet the Situation Fairly and Squarely

The industry which we represent has been facing, for the past few years, a condition which has proven little less than fatal to the majority of gas companies in the country, and the principal reason has been the reluctance on the part of public regulatory bodies to meet the issue fairly and squarely, although it can be truly added that representatives of the industry have in many cases failed to give the commissions the ammunition with which to meet the issue fairly and squarely.

In so far as the domestic and commercial part of our business is concerned, the necessity for commissions making certain that our requests for increased returns are justified is admitted, and in this field it has behooved the gas company managements to anticipate conditions sufficiently to overcome the handicaps of any delay which may have been necessary to give the commissions sufficient time to investigate the merits of the requests for rate increases. It is not the intention of this paper to deal with the merits of gas companies' requests in this particular field of their business.

In so far as our industrial sales are concerned, however, I maintain that delays in granting these requests for increases in rates have not been warranted, and this paper is a plea for the consideration by the regulatory bodies of the fact that that portion of our business which has to do with the supply of service to industrial plants shall be considered as free from the customary restrictions imposed by commissions upon our other classes of business.

Consumers Free to Install a Competitive Fuel

The major portion of artificial gas sold to industrial plants in this State is sold in large blocks, and to a class of consumers in a position to install a competitive fuel, such as coal, coke or oil. In fact, during the years when industrial plants had not learned the advantages of artificial gas for industrial uses, it was necessary for gas companies to have trained experts in the field to interest industrial plant managers in the use of this form of fuel, and to hold this class of business during normal times we are still forced to have these trained experts in order to meet the running competition to be met from those interested in the sale of competitive fuels.

It had been generally recognized that the fundamental object of a public regulatory body is to protect that class of consumers who are dependent upon the service which a public utility furnishes, and it would seem that so long as the non-competitive class of business is not being penalized, the public utility should be allowed to handle that portion of its business which may be classed as competitive, as may best meet the commercial requirements of the business.

Given a free rein as to the allowable profit from the competitive class of business, the central station management can be relied upon to not sell its product at a loss. I know of no case where a regulatory body has been forced to take action against a privately owned utility for rendering service at a loss. The law of self-preservation always takes its natural course where private interests are involved, although our present theory of regulation and the difficulties encountered in obtaining rate increases often acts to delay the application for them even in cases where an analysis may fully justify such increases.

An Inducement to Gas Company Not to Make Rates Unreasonable

The loss of large blocks of competitive business may react very unfavorably upon the unit cost of its product to the gas company. This means, that in dealing with competitive business, we are confronted with the element of risk, the absence of which in our business has been the basis of the theory upon which the return to a public utility is restricted.

To be consistent, therefore, this class of business should be free from the restrictions of regulation, and a gas company should be allowed to earn such a return from such business as the traffic will bear.

Having a large volume of this class of business has made it possible in the past for public utilities to finance improvements otherwise considered impossible, and the facts are that those public utilities having a large industrial load have the record of rendering serv-

ice to its non-competitive consumers which they could otherwise not expect to receive excepting at rates much higher than under the existing conditions. In justice, therefore, to that class of consumers whom it is acknowledged the commissions were organized to protect, commissions are fully warranted in allowing public utility companies an unrestricted rate of return from its competitive business.

Shifting Investment Burden Onto the Utility

During the past few years, industries throughout the country have found it to be of great financial advantage to themselves to use public utility service. This has meant for them the elimination of large investments in the matter of plant equipment at a time when they would be forced to pay exceedingly high rates for financial accommodation. The burden of raising this money they have passed on to the public utility company, and the public utility companies have not been able to protect themselves in view of being forced to maintain rates based on the theory of a restricted return on the capital investment. This has been manifestly a very unfair and economically unsound situation.

During the great industrial expansion since the signing of the armistice, this tendency on the part of industrial plants to shift the investment burden to the public utility companies has been especially pronounced, and the time has come when public utilities must, in fairness to themselves, refuse to keep up with this demand unless they are allowed to take on this business at rates which under present conditions the industrial plants are both able and willing to pay.

To restrict the expansion of a public utility is an injustice to the community which it serves, and it is with great reluctance that public utility executives are forced to adopt the non-expansion policy.

Under present conditions, therefore, the public regulatory bodies are fully warranted in recognizing that, in so far as competitive business is concerned, public utilities should be allowed to take into consideration as one of the principal elements of their rate-making the value of the service to the industrial plant.

In a number of earlier cases in the courts on the matter of rate-making, three important elements were recognized as having an influence upon a proper rate schedule:

First.—The cost of producing the service.

Second.—The risk involved in the enterprise.

Third.—The value of the service.

Fortunately there can be noted a decided trend towards this viewpoint on the part of many of our State commissions, but it is unfortunate that conditions which have come upon us during the past few years have been necessary to a recognition of the merit of this viewpoint.

It must be remembered that the bulk of the public service commission activities which it has been necessary to look upon as expressions of policy was developed during the fifteen years previous to 1915.

This was a period of persistent and steady growth. During these fifteen years practically all of the utilities operating in large communities were visited by a gradual increase of business, with the result that the great bulk of public service decisions were in the line of a reduction of rates and a consequent reduction of the net earnings of the utility companies, and many a marked injustice was done to a utility through a decision of the commission which would be corrected through an increased volume of business, largely of a purely competitive nature.

There Is a Distinct Element of Risk

During this period the popular and politic thing to do was to reduce rates and earnings, with the result that commissions gradually began to ignore both the elements of value of service and of risk, and at the same time adopted a low rate of return upon the utilities investment, upon the theory that the business was being exercised as a monopoly with practically a guaranteed rate of return.

The experience of the last three years, however, has developed very forcibly the following facts: First, that there is no guaranteed rate of return to a utility; second, there is a marked risk to the business; third, that reasonable rates shall not mean the lowest rate on which a company can render service and still remain alive, but means a rate that is reasonable in view of the nature of the business, the cost of producing service, the risk involved in the service, and such rate of return as will reasonably attract capital and operating ability to the industry. In distributing the expense necessary for this purpose, it is right that the commission look into the manner of classification of a company's business to determine if each of the various classifications are actually standing the burden which should be assessed against them.

It is my contention that the additional investment required to care for large industrial consumers, together with the fact that such customers are in a sense temporary, constitutes the most important risk incident to the business. In other words, the patrons of a utility immediately drop into one of two classes—those dependent upon the utility for service, and, second, those who might reasonably get along without the service. Practically all sales for commercial and domestic usage afford classes dependent upon the service. It follows that wherever population is centered a utility catering to the above classes is very reasonably certain to have a continuous volume of business.

There are elements of risk even in this business; shrinkage in population may result in an over-construction, but this particular occasion of risk is more apt to occur where a large part of the construction is installed to meet the requirements of an industrial load which is temporary, in that it will get off the lines just as soon as it can more economically produce for itself. This industrial business is sold purely on a basis of competition and value of service. The value of service to the consumer is measured by the cost of his substituting another satisfactory service.

It would seem that the freedom of the industrial user to purchase or not to purchase the product of a utility, as distinguished from the dependent position of the average household user, together with the fact that he deals at arm's length with the utility and is able to take care of himself, should put this class of business on a different status as to the rate of return which a utility might earn. One can easily justify a substantially higher rate of return based on the question of risk alone. It would seem, however, that in addition to the question of risk, a degree of liberality should prevail, based upon the value of service.

Need of Immediate Action in Going After Industrial Business

J. Weaver Smith Points Out That Low First Cost Is No Longer a Prime Consideration—Quality and Speed of Production Are Paramount

A few years ago we thought it wonderful business to make an installation of a few confectioners' furnaces, or small tool-hardening furnaces. Yet to-day it is not so wonderful to install a gas-fired furnace 57 ft. high and about 15 ft. in diameter for the heat treatment of large naval guns, declared J. Weaver Smith, industrial engineer, Citizens Gas Company, of Indianapolis, in a paper before the Indiana Gas Association convention.

I remember that about the time I did my first industrial gas work, my immediate superior discouraged the idea of soliciting certain classes of installations, stating that it could not be done with "dollar gas." Yet it is being done to-day and at even higher rates. I refer particularly to brass melting. There is on the market to-day a brass-melting furnace which has shown by test that brass can be melted for a cost of 20 cents per 100 lb., with a gas rate of $1 per 1,000 cu. ft. This furnace is designed and constructed to use the heat formerly lost through the vent, for preheating purposes. This cost of 20 cents per 100 lb. compares very favorably with coke at $4 per ton or oil at 4½ cents per gallon.

We have an ever-increasing demand for the "clean fuel" to replace the dirt, soot, ashes, etc., of the factories, which are endeavoring to keep up with the times and increase production. This is especially true with the foundries. A short while ago they would have nothing but coke or coal-fired core ovens. Yet to-day they are clamoring for gas-fired core ovens. The old antiquated methods are rapidly going into disuse. This is true in many other lines of work. In the past it was thought generally that drying and heating on a large scale were best accomplished by means of steam coils. The earlier enameling ovens were steam-heated, yet they are a rare thing to-day. The heating of liquids in large quantities was formerly done with steam with a very low efficiency, while to-day with direct gas fire an efficiency of 75 to 95 per cent is obtained.

In Any Drying Operation Gas Is the Logical Fuel

Regarding drying operations, I venture to say there is not one which cannot be done more economically with gas than any other fuel.

There is hardly a day passes but what some new industrial application is made. Gas is about the first thing a manufacturer or business man thinks of when heat is required. Why? Because it is what might be termed the universal fuel; it is clean; it is convenient; it is most economical.

The day of selling on price alone is gone. To-day price is a secondary consideration. Quality and speed of production are paramount. The manufacturer is no longer lured by low first cost. We all know that it does not pay to buy cheap goods, and so knowing we should not be afraid to try to sell the best and at the highest price. By selling only the higher priced and better goods you command a prestige that cannot be shaken, and make friends that are everlasting friends.

Need of Getting Ready in Time

The appliance manufacturers have standard appliances to fit practically every need, and stand ready and willing to co-operate with you in building special appliances. Are you co-operating with them? Are you pushing the sale of industrial appliances, or are you sitting back and waiting for the manufacturer to do that? I know that a number of appliance manufacturers have received so little co-operation from gas men that they have been obliged to put selling forces into some territories and absolutely disregard gas companies. A good many of you have been clamoring for higher gas rates, and yet you have been asleep as far as this appliance business is concerned, on which there can be made a handsome profit. How many of you have made an industrial survey of your city? If you have, how long ago did you make it? Have you repeated it? Don't get the idea that there isn't any more industrial business in your city. There will always be more as long as your city continues to grow.

We have heard a lot of talk, especially among laymen, that electricity would succeed gas for all heating applications. Such is far from being the case. There have been a few applications made with electricity, but in each and every case, with the possible exception of steel making and very minute applications like linotype machines, gas has proven far superior. One of the electrical manufacturers has a department devoted to the manufacture of electric steel-treating furnaces, and yet for their own use they have gas-fired furnaces. Why? Because they can obtain a much better quality of production and economy of operation. So we have nothing to fear from electric competition.

There are very few manufacturing processes which do not require heat in some form or other, and each and every case is a prospect for an industrial gas application. So the business is there waiting for you. Some of it will come to you without solicitation, but you will have to go after the bulk of it.

A Dearth of Sellers

Now the demand for industrial gas is growing in proportion with the knowledge of its varied use, and will continue to grow in the same proportion, and the sooner you distribute this knowledge the better it will be for your gas sales.

Are you prepared to double, triple, or quadruple your output, as far as plant and main capacity are concerned? The plans you are making now—are they for the immediate future only or will you prepare now for that big business which is bound to knock at your door a few

years later? Is your company living that hand-to-mouth existence that so many are? What are you doing toward reaping that big harvest of both gas and appliance sales now looming up on the horizon?

There are not enough properly educated and trained salesmen now, and there is no school from which you can obtain them. Don't you think it would be a good idea to start right now training one of your employees for this work? Then when the big business reaches you, you will not be unprepared to receive it, as so many of the larger companies find themselves to-day. Select your young man carefully, taking into consideration that he should have a good education, a broad mind, an inclination toward engineering, and at the same time have full confidence in his ability to do things. With the proper handling such a young man will more than fulfill your anticipations.

I cannot impress upon you too strongly the need for immediate action toward going after industrial gas sales. The man who is content to sit still and take things just as they are without making provision for the future will soon be shoved aside and replaced by one who is wide awake, active and progressive.

Dry the New Broom

I don't believe there is anyone who will not agree with me in the statement that there is a wonderful future for the industrial gas business if we only make the proper effort to get it. But aside from the view of profit to ourselves, there is the greater thought of the immense amount of good that can be accomplished thereby. We were put here in this world to do all the good we possibly can toward the welfare of our fellow beings. As I see it, there can be no nobler work than the increasing of efficiency, and whenever we make an industrial installation which speeds up production, lowers cost of operation, improves quality, or makes labor available for other work, we are increasing the efficiency. So let us take a firm grip and make our deeds speak for themselves.

No doubt you have a bakery, or several, in your city. Approach him now regarding gas-fired oven, doughnut fryer, or steam boiler. There is the photographer who develops and prints kodak pictures. The films can best be dried with a gas-fired air heater. The prints can best be made with gas lamps. The brooms in that broom factory have to be dried, and the laundry can be persuaded to discontinue steam in its dry rooms. The storage battery service station needs a torch and melting pot for repairing batteries, as well as a lead-burning outfit. The garage should use a gas-fired caustic soda tank for cleaning up oily and greasy parts instead of using expensive gasoline. That cabinetmaker's shop needs a glue heater. That furniture factory needs a torch for singeing off the fuzz on rattan. That chemical plant needs a water still. That newspaper needs a dross-melting furnace. That hospital needs an incinerator. That small manufacturer needs a japanning oven or steel-hardening furnace. That foundry needs a brass-melting furnace and a core oven. That pattern works needs an aluminum-melting furnace. That ice cream parlor needs a kettle for cooking syrups. That candy kitchen needs a confectioner's furnace. And so on I could name hundreds of other needs, but neither time nor space will permit. The whole thing is this: The business is there. Are you going to get it?

Labor-Saving Devices that May With Profit Be Used in the Gas Industry

George A. Neal Enumerates Sixty-Seven—When It Is Wise to Invest in Them

In common with the entire industrial world the gas industry is confronted with the problem of meeting the rapidly growing demand for its product and overcoming the handicap of a constantly diminishing supply of suitable labor. In order to harmonize these two extreme conditions successfully we must analyze the situation carefully. The solution of the problem requires that we overcome the labor shortage, high labor rates, large labor turnover and high material costs in such a way that there will be a suitable margin of profit left after paying expenses out of the prevailing low and practically inflexible selling price, stated George A. Neal in a paper before the Indiana Gas Association convention.

Reliable reports indicate that the so-called labor shortage is world-wide, with no known surplus, eliminating any immediate prospect of rearranging the world's labor supply to relieve the prevailing scarcity. Best counsel, therefore, indicates that every mechanical expedient must be applied to remedy this condition.

An Industry Whose Every Service Is Labor-Saving

The gas industry, occupying the keystone of the public utility field, is founded upon its labor-saving service to the community, and the present-day demand for its product is chiefly due to its popularity in this role. This feature suggests a progressive consideration of all labor-saving devices and methods applicable to our business.

It should be remembered that the comparative relation between the cost of money and of labor is practically the same as in the more stable past. Whereas labor requires more and delivers less value than formerly, in the same manner the other agent of industry, capital, costs more and buys less in nearly the same proportion. Labor-saving devices installed during current times should carry a heavy retirement rate. In contrast to this it is evident that devices installed in normal times by progressive operators are to-day paying handsome dividends.

Points to Be Considered

The diversity of situations is so great that the needs of each station must be analyzed and proper devices adapted to its particular need. In making the best installation it is necessary to consider the fundamentals underlying the design.

In selecting labor-saving devices the following points should be considered:

1. In general, every device must stand the test of whether or not it is profitable.
2. Standardization of operation or product is the first step toward machine control and lower cost.
3. Eliminate heavy work requiring very strong men.
4. The simplest tool is a labor-saving device and

is frequently as valuable as more intricate and expensive machinery.

5. Good lighting, convenient arrangement and good working conditions are instruments of production.

6. Conservation of material through improved engineering is equivalent to greater production.

7. Increased capacity from old equipment, due to better methods, reduces the number of units in service.

8. Use of better grades of raw material saves labor.

9. Night work should be reduced or eliminated by storage facilities because of:

(a) Inefficient night workers.
(b) Poor supervision.
(c) Reluctance of men to work nights.
(d) Possible use of lowest grades of help only available by day, such as old men, boys, women and transient workers.
(e) Piecework possibilities.

10. The intelligent worker is more productive and reliable than ever.

11. The ordinary worker is less valuable than formerly.

12. In the past labor-saving devices enabled an unskilled man to do the work of several skilled mechanics.

13. At present such devices are necessary to secure the co-operation of skilled men in performing work formerly done by common labor.

14. The handicap of winter work must be overcome, so as to give the seasonal worker a full year's work.

15. Emergency conditions must be overcome by storing materials during the months of surplus supply.

16. The operations which are absolutely essential should be mastered first.

Some Applications

The following concrete applications of labor-saving devices are suggested and are considered from the standpoint of executing the vital work in spite of current handicaps as well as from the financial returns expected. In some cases the method operates indirectly.

1. High unloading trestles—fuel received in self-dumping cars. One man performs the work of five shovelers.

2. Elevated runways to enable coke wheelers to handle coke direct from car to sets. Saving: Half-hour labor per ton handled.

3. Overhead fuel bins filled by elevators receiving fuel direct from track hoppers. These bins should be large enough to carry the plant during the night and preferably over Sunday, and designed to charge the generator, retort or boiler furnace without re-handling. Bins should be accessible so that advantage can be taken, when being filled from storage piles, of any available labor or labor-saving devices, such as horse-drawn vehicles, cranes, motor-operated self-dumping wagons or automatic conveyors. Saving: One hour labor per ton handled. In a plant making 1,000,000 cu. ft. of water gas per day, an overhead coke bin will save, at 50 cents per hour for labor, $3,000 per year.

4. Cranes, elevators and automatic conveyors for unloading to storage, reclaiming from storage, loading coke and ash wagons, or filling purifying boxes. One man equals five shovelers.

5. Overhead ash bins discharging direct into railroad cars, wagons or self-dumping trucks for removal to dumping place. These should be filled by bucket elevators, steam jet conveyors or ship hoists, which will transfer the refuse from the point of origin to storage without rehandling. Saving: One hour per ton handled.

6. Rotary screens to recover coke from breeze or ashes.

7. Automatic water-gas sets. Saving: Half of water-gas maker's time when operating one set. If two sets are in service, one operator will operate two sets. In the latter case the estimated saving per year will be $5,000.

8. Installation of hydraulically operated valves on hand-operated water-gas sets.

9. Large high-pressure blowers to increase the output of old water-gas sets 30 to 50 per cent. Saving: If one shift can be laid off—$10 per day; if one set can be cut out—$30 labor and $10 radiation loss per day, a total of $40 per day, or $14,600 per year.

10. Enlarged connections and modern linings on old water-gas sets to increase capacity 10 to 20 per cent.

11. Installation of large water-gas sets, replacing two or more small sets. Labor and fuel saving per year, when operating one set instead of two, will be $40 per day, or $14,600 per year.

12. Smooth runways, storage bins, boiler-room floors or any place from which material is shoveled.

13. Well-balanced tools, coal and coke buggies.

14. Hold-up bars, water in fire to shatter clinkers while cleaning water-gas machines.

15. Special barring-down machines to break side wall clinkers in water-gas generators. This operation, the hardest in a water-gas plant, can be well done without fatigue by 50 per cent of usual force.

16. Waste heat boilers to reduce boiler fuel. Average saving 50 per cent of fuel used.

17. Automatic stokers, soot blowers, air-tight boiler settings, soft boiler feed water, feed-water heaters, damper regulators in steam plant. These, in connection with items Nos. 3 and 5, enable one man to replace five men in large boiler plants.

18. Self-draining drips or central steam pump for pumping yard drips.

19. Recording temperature and pressure gauges to record data normally compiled by inspection.

20. Direct reading gauges on gas holders, oil, tar and ammonia tanks.

21. Motor-driven pumps, blowers, exhausters, pushers, and compressors with small steam reserve, in combination gas and electric plants, concentrating the coal consumption in one boiler plant.

22. Exhaust steam for heating holders, tanks and buildings, reducing coal consumption.

23. Charging and discharging machines in retort houses.

24. Revivification of oxide in situ with complete exhaustion of oxide without change. Labor of changing reduced to 25 per cent and labor of turning oxide eliminated. Storage of partly used and new oxide reduced.

25. Outdoor purifiers with contents on portable trucks. Changing done at leisure in open air.

26. Tar extractors, washer scrubbers and con-

densers to prevent tar and oil on oxide, and stoppages in the distribution system.

27. Suitable condensing equipment at works outlet to remove condensible water and oil vapors, eliminating pumping of distribution drips and service complaints. Pumping expense and service complaints cut in two.

28. Plastic firebrick or cement for repairs or even new linings in generators and furnaces.

DISTRIBUTION DEPARTMENT

1. The location of the storeroom convenient to a railroad siding and at a suitable elevation, so that material can be handled to storage and from storage into trucks without elevating.

2. Light platform trucks to move material from storeroom direct to the delivery trucks, without carrying or rehandling.

3. The use of automatic counting machines for counting fittings and other small objects.

4. The installation of large meter provers filled by compressed air to expedite testing of large meters and to eliminate frequent filling.

5. Motor equipment for gas shop. Output per man increased 50 per cent.

6. Motor equipment for street work. Labor saving for service and emergency work at the rate of 200 per cent of investment per year.

7. Motor drip wagons with motor-driven pumps.

8. Service blow pump charged by truck engine.

9. Large drips at important places. Less travel for same result and cost reduced 50 per cent.

10. Trenching machines. One man equals ten to twenty men.

11. Trench-thawing outfits to expedite street work in the winter.

12. Pipe pushing or boring machines for service work. One man equals three men on ordinary work or five on work under paving.

13. Two-wheeled pick-up carts, enabling two men to do the work of five when moving heavy pipe.

14. Tamping machines.

15. Compressed air for caulking joints on large mains.

16. Valve-inserting machines for installing valves in high-pressure mains without shutting off main.

17. Welding outfits.

18. Power-driven pipe-threading machines in shop.

19. Steam thawing outfits.

COMMERCIAL OFFICE

1. Calculating machines.
2. Adding machines.
3. Addressograph machines.
4. Coin counters for quarters.
5. Change machines for cashiers.
6. Billing and bookkeeping machines.
7. Hollerith machines for classification of pay rolls and ledgers.

The time saved by each operator using the above devices is equivalent to two to five clerks.

The following schedule shows the division of labor employed in an average Indiana gas industry selling 1,000,000 cu. ft. of water gas per day, having 15,000 consumers, and is based on the average for the year:

	Operating	Betterment	Merchandise	Total
Production	14	..	..	14
Distribution, shop, stores, transportation	8	4	8	20
Street	6	20	..	26
Commercial—				
Cashiers, bookkeepers, collectors, meter readers, etc.	20	..	..	20
	48	24	8	80

In a coal-gas plant the total operating force would be sixty and total employees ninety-two.

The writer believes that by the adoption of the best methods and labor-saving devices the above force can be reduced 20 per cent in the average plant. When it is considered that the yearly interest charge of a plant of the above size is approximately $60,000 per year, the relative value of such a reduction upon earnings is very evident.

How Much Lubricant Does an Engine Need?

How do you know whether or not you are feeding your engine bearings sufficient oil? In what way are you doing the oiling? Are you giving them a few drops at a time, every once in a while, and trusting to luck that there will be no hot box and that the friction horsepower will be maintained at approximately the most economically low point? Have you looked into the lubricating problem with much thoroughness?

The above questions are asked so bluntly because the chances are ten to one that you have been satisfied with the old method of lubricating. Most owners, superintendents, managers and engineers are. You haven't been made to feel that a change in your system is worth while. Much experimenting has been done in this important subject in recent years, and as a result automatic lubricating and filtering systems have been developed that are marvels of thoroughness in that they keep all bearings supplied with copious streams of oil at all times, reducing the necessity of keeping the bearings screwed up tight all the time. Looseness is no longer so much of a crime. The oil keeps the "cracks" filled up and the shaft and bearings operate on a thick film of oil without coming into actual metallic contact. Vibrations and shocks are muffled. The oiler doesn't have to climb around on a ladder and get into dangerous places. In fact, there is no oiler whatsoever; he is eliminated. Oil isn't constantly spilled on the floor, because it is kept within pipes or in tanks where it cannot spatter. If any dirt or grit gets into the bearings it is washed out by the rapid flow of oil, carried along with the oil, and finally filtered out. Money is saved because labor is dispensed with, repairs become less frequent, because of the power saving the yearly coal bill is lessened, and, due to the fact that the oil is used, filtered, used again, and so on, the yearly cost of oil is reduced to the very minimum. The quality of the oil does not appre-

(*Continued on page* 347.)

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Contents of This Issue

MIXTURE OF BENZOL, TOLUOL AND GASOLINE PROPERLY MADE FAR SUPERIOR AS MOTOR FUEL TO ORDINARY RUN OF GASOLINE—R. E. KRUEGER 337

WOULD REMOVE CONTROL OF COMMISSION OVER RATES CHARGED INDUSTRIAL USERS..... 339

NEED OF IMMEDIATE ACTION IN GOING AFTER INDUSTRIAL BUSINESS 341

LABOR-SAVING DEVICES THAT MAY WITH PROFIT BE USED IN THE GAS INDUSTRY..... 342

HOW MUCH LUBRICANT DOES AN ENGINE NEED?. 344

EDITORIALS 345

PUBLICATIONS 350

NEWS OF THE GAS INDUSTRY..... 351

CONSTRUCTION NOTES 355

PERSONAL NOTES 356

As the Journal Views It

The Cost of Service

Service in most lines of activity in this country had been brought to the point that the average man in any line of effort apart from his own particular vocation had become pretty much of a nonentity.

Cleaning the burners of a gas range is not a task that calls for an unusual degree of skill or intelligence. Yet so accustomed had the average citizen become to having an oversolicitous gas company attend to this for him that he began to regard it as one of those strictly specialized tasks. He would have shied away from it as from an invitation to design a suspension bridge.

We had become a nation of world-beaters at specialized callings and practically worthless at anything else.

If the faucet leaked, we called a plumber. This cost us a dollar or so, and we could easily have done it ourselves in a few minutes but we didn't feel up to the responsibility. When one has an electric wiring job to do he doesn't call in a shoemaker.

A home a mile from the railway station was "too far out." If there happened to be a near-by street-car line and we could afford the extra fare we might then have considered it. But when that street-car line was blocked or stopped we were helpless. Industry was paralyzed. How could we be expected to get to work when there was a whole mile walk between us and the station?

Just how much the general helplessness of the average American has had to do with unreasonable labor exactions might be hard to estimate, but it has been considerable. When white-collar men, in desperation to get to their living, started in to fire

the engines that striking workmen refused to fire, the striking workmen speedily came back.

Of course, at the beginning it was easier to temporize even to unreason than get out of the ruts we had gotten into. But temporizing with right, with justice, with unreason and plain madness, never pays. After months and years of conditions gradually growing worse, the American people are beginning to learn the truth of this.

If the cost of gasoline is high because it is scarce, the American people can remedy the situation by a means so little drastic as simply learning to use it efficiently. But this course would require an exertion of the mind. The same mode of treatment would so lessen coal demand as to bring in the element of competition again, which in itself would make for lowering prices and costs.

Specialization, undoubtedly, has done much for us. But it has also reduced us largely to a sense of mental and physical helplessness. We do not want to get back altogether to the self-sustaining family idea, but if we moved slightly in that direction and got away somewhat from our extreme and senseless dread of being inconvenienced a little we might well be considerably ahead on our way to settled conditions.

Saving Oil in Gas Making

A very clearsighted review as to the gas-oil situation is afforded in Service Letter Number Seven of the American Gas Association.

In brief, there seems but one solution to the problem—drastic conservation of oil in gas making.

Of course, there is small logic in going deeply into technical refinements to secure this end while some companies, with considerable makes too, unfortunately are compelled to literally dump this valuable resource into the gutter through adherence to a candle-power standard. Nor is merely shifting to a heat-unit standard a remedy, so long as that standard is set unnecessarily and absurdly high.

A vast use of oil is possible to be done away with in gas making by tending more to the coal-gas process. But shifting over to coal gas must be preceded by the construction of coal-gas plants, which at this time are so expensive that it is questionable indeed if any great eventual saving could be expected from this expedient.

The immediate and sensible remedy is to manufacture a gas adapted to meet present-day needs; a gas that meets the needs of modern usage, rather than the needs of the usage of a generation or two ago. The common-sense gas of to-day is a moderate heat-unit standard. Its general adoption will not remove the oil element entirely from the high costs of gas making, but it will help so considerably as to make the immediate reaction seem almost one of relief.

Need for Greater Interest Rather than Less

Those gas companies which, even lacking wartime stimulus, do not lapse in their interest in employees' gardens bid fair to avert a considerable amount of vexation as to labor when the cold weather again comes upon us.

We hear a great deal of lack of labor on the farms. And the same lure that attracts the farm laborer, the big wages in industrial plants, is also attracting farm owners as well. In Michigan, they tell us, for example, that many hundred acres close to Detroit stand practically untouched. Their owners find it practical and profitable to motor in to the automobile factories each morning and motor back again to the idle farm each night.

Yet who can blame the simple farmer? When he tries to raise the price of his foodstuffs to a level where he can buy shoes at the price excessive demands of industrial workers aid potently in placing them, a nation-wide protest arises. We do not worry at the wry face the other fellow makes as he takes our medicine, but how indignant we are when he asks us to take a taste of his!

So rail not at the farmer when he finds the way out of a most unsatisfactory condition. He has to live, and intends to live. If he cannot accomplish this on the farm, then truly he is a fool not to go where he can.

But this tendency on his part takes the glitter out of the industrial worker's excessive dollar. Why have sufficient of them to, in ordinary times, buy many bushels of potatoes if there are but few bushels to buy?

By painful processes we are coming around gradually to paths of reason.

It seems very alluring, looking at it on one side merely, for the railway worker to get three dollars where he got one before. But when he does that things go out of balance. The farmer, the gas worker, the shoemaker cannot comprehend that they should get less relatively to the railway worker than before. They, of course, must get theirs, too. So in time it will round out to what it was before. Each of us may have ten dollars where previously we had one, but the purchasing power of our inflated capital will be just about the same as our sound capital was before. The glitter is all in the sound of the figures, not in the fact.

But while the readjustments take place there must be shortage of production. If the shoe workers must take time off in strikes, then, of necessity, there must be less shoes.

Now, while the farmer is getting himself adjusted there must be less food to go round.

The provident in these times will help themselves. If the farmer declines to produce our full quota of foodstuffs, then we must produce as much of the deficit as possible ourselves. The employee garden is a step in this direction.

Turning Downward

Bank deposits have been reduced a billion dollars. This is encouraging, for bank deposits as shown on the book do not reflect thrift and saving so much as they reflect loans and credits.

Easy credit is an advantage, a stimulus to business activity, but too liberal a credit makes for inflation and unwarrantably high prices.

The reduction in loans indicates either that people have caught up to their debts or that they are holding back from new ventures until things settle down.

So long as we went on buying regardless of the conditions or times, so long as we competed frenziedly for labor's product regardless of labor's exactions, we could not but expect that progressively labor would build up exaggerated visions of its own power.

When we, the purchasers, get down to reason in our purchases; when we practise moderation in getting along without those things we only fancy we need, and confine ourselves to the things we actually do need, we can expect the producers of those things to curb their wild fancies. Our madness is reflected in their minds as truly as our extravagance is reflected by them.

We've all been through a spree of trying to believe we were some sort of superior thing that must be pampered and indulged, that can live and live luxuriously without producing. The decreased bank deposits more or less indicate we are coming back to reason. The turn to lowering prices cannot now be very far away.

How Much Lubricant Does an Engine Need?

(*Continued from page* 344.)

ciably change. Since one bearing may need considerably more oil than another, it is a simple matter to constantly feed the right amount to any given bearing, large or small, high speed or low speed.

So many experiments have been performed upon engines and so much experience has been had with lubricating problems that it is pretty well known by this time how much oil any engine of a given size or speed demands for proper and thorough lubricating.

Based upon tables that are the outgrowth of innumerable tests of this sort, the writer has therefore developed a "handy chart" which tells at a glance the amount of oil needed for any ordinary Corliss engine of medium speed, any ordinary cross-compound engine, or any ordinary high-speed engine.

Simply lay a straight-edge across the chart, joining the kind of engine (curved marked "A") with the horsepower of the engine (column "C"), and the intersection with column "B" immediately gives the number of gallons of oil needed per hour.

For example: How many gallons of oil are needed per hour by a 550-hp. cross-compound engine? Connect the point corresponding with "cross-compound" (curve marked "A") with the 550 (column "C"), and the intersection with column "B" shows the answer as being 15 gal. per hour. The dotted line drawn across the chart shows how it is done.

A high-speed engine of the same power will require about 17 gal. per hour, whereas a simple Corliss engine will need only 13 gal. per hour. The range of the chart is great enough to take care of most engines up to 2,000 hp. Thus a 2,000-hp. high-speed engine would require a bit more than 50 gal. of oil per hour.

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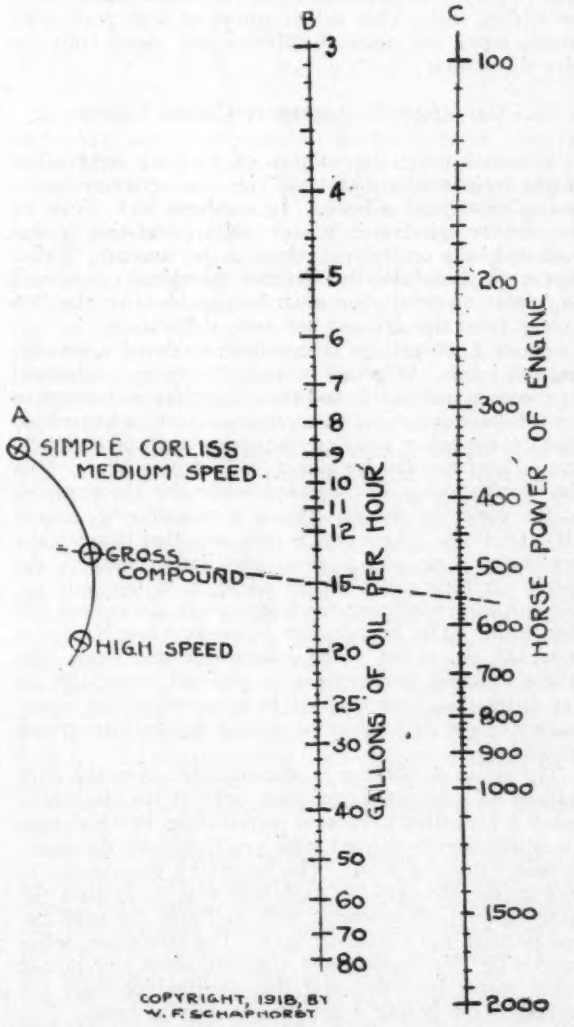


CHART SHOWING AMOUNT OF OIL NEEDED FOR ANY ORDINARY CORLISS ENGINE

Mixture of Benzol, Toluol and Gasoline Properly Made Far Superior as Motor Fuel to Ordinary Run of Gasoline

(*Continued from page* 338.)

cator for this purpose; much more sensitive than methyl orange.

The acid that comes over in this distillate is usually in the form of $SO_3 + H_2O$ so that with a little experience the tester can tell by the smell of the distillate as it comes over whether or not it is acid in character. As a matter of fact SO_3 can be detected by smell in some cases when it will not show up with methyl orange.

Assuming that the batch has had sufficient agitation with alkali to remove all acid, it is allowed to settle about twenty minutes and the alkali drawn off into the waste alkali tank. The last ten or fifteen gallons of this is usually a dirty scum which is discarded. The batch is now washed twice with 100 gallons of water. There is practically no danger of emulsification when washing an alkaline oil with water. After the water has been drawn off the oil is pumped into the 10,000-gallon batch rectifying still. This still is equipped with perforated steam pipes for steam distillation and steam coils for dry distillation.

Too Vigorous Agitation Causes Losses

Before leaving the subject of washing light oil it might be pointed out that too vigorous agitation causes undue volatilization losses. In northern New York we use air for agitation in winter and a circulating system actuated by a centrifugal pump in the summer. Either one works satisfactorily. In case the agitator is housed in, plenty of ventilation must be provided for the SO_3 fumes from the agitator are very suffocating.

About 7,000 gallons is usually considered a rectifying still batch. When all is ready the steam is admitted to the coils in the still and the oil rapidly warms up to lowest boiling point, when the steam is adjusted so that the condenser and decanters can comfortably handle the oil and entrained water as it is driven over. This dry distillation is discontinued when the thermometer at the outlet of the still shows a temperature around 100 deg. Cent. The steam is then admitted through the perforated pipe and a steam distillation finishes the batch. A little steam is still admitted to the coils for the purpose of keeping the temperature up around 110 deg. Cent. The temperature is never allowed to run over 120 deg. Cent. The reason for this being that when a higher temperature is attained, especially on dry distillation there is apt to be a decomposition taking place whereby SO_2 will come over in the distillate giving an acid oil.

The steam distillation is discontinued when the dark colored oil commences to come over at the decanters, unless it is desired to recover naphthalene, in which case the distillation is carried until practically all the naphthalene has come over. The necessary precautions to take in the recovery of naphthalene is to by-pass the rectified light oil receiving tank and run the naphthalene portion into a separate tank. The condenser, while recovering this naphthalene fraction, must run hot or fairly warm in order that the naphthalene does not crystallize out before it gets to its receiving tank.

Just a word now in regard to decanters. Decanters are quite essential for these reasons. They separate any free water from the oil leaving the condenser; they remove any dirt or scum formation which occurs in any steam distillation. By removing free water they also serve to take care of leaks in the condenser. These decanters can be designed to have automatic oil and water overflows, and to be arranged either in series or in parallel; usually two is all that is necessary. A series of decanters connected with a 2-in. pipe can easily handle 800 to 1,000 gallons per hour.

Accompanying this article is a rough cut of two of these decanters in series:

Proper designed decanters will remove all free water. By free water, I mean water which is not in physical combination with oil. Usually all the oil which leaves the decanter has some water in it in the form of an emulsion. This goes over into the rectified light oil receiving tank, and after standing for about eight hours the water settles out leaving a pure water white oil. This so-called emulsion has a pronounced milky color. It is surprising what a very small amount of water, if properly disintegrated, will produce this effect—a few drops per gallon will cover the whole amount. This water which settles out in the receiving tank is drawn off periodically.

So much, then, for the manufacture of pure light oil from crude light oil. It might be well to pause here to give a few figures showing costs of purification and cost of production.

Usually about 0.3 lb. of H_2SO_4 per gallon of crude light oil is used for acid wash, and about .04 to .05 lb. NaOH per gallon of crude oil is used for neutralization of the acid oil. About 3 to 5 per cent of the crude oil put into the agitator is lost in the form of sludge during the process of washing. Of the washed oil put into the still between 75 to 85 per cent is recovered as finished product. The cost of the crude oil all depends upon the way it is recovered, in what sort of a plant it is recovered, the overhead, etc., so that it is rather a hard figure to give. Some operators have a considerably lower cost of production than others. The quantities given above give anyone a fair idea of what the cost of purification is, if you base your calculations on current prices of acid and alkali. I might add here that the usual testing connected with the purification of light oil does not necessarily need a chemist. It does require a fairly well trained chemist to lay out the work, standardize solutions and occasionally instruct and supervise the work. It is also of considerable advantage if a trained man is in charge of the operation of the plant.

My point is merely this: The whole light oil motor fuel game is so bound up in itself and the manufacture is so intricately mixed up with the ultimate success or failure of the material, as it comes to the market, that it seems to me a centralization of responsibility is very essential. Too many cooks spoil the soup.

Rectified Light Oil as a Motor Fuel

This rectified light oil can be used as a motor fuel, and under certain conditions it gives very satisfactory results, both as to power developed and mileage, and it gives the motor what many drivers call "pep." This is especially noticeable in the ease with which a car can be handled in congested traffic. A good quality of motor fuel will easily show a 40 to 50 per cent increase in mileage as compared with good grades of gasoline.

Purified light oil, however, has two disadvantages under certain conditions. It has a high freezing point,

consequently it cannot be used in winter in such regions as northern New York without running into the danger of freeze-ups, which are obviously a mean thing to contend with. In regions where the winters are not so severe as in this locality, this does not designate itself as a disadvantage.

The other self disadvantage is this: Purified light oil used as a motor fuel means that a slight carbureter adjustment is necessary; that is, the supply of air has to be considerably increased. This obviously is a very easy thing to do, but nevertheless it has been our experience that the majority of people know little or nothing about a carbureter and, furthermore, they do not care to know about it and they do not want to be "monkeying" with one. This could be overcome in at least two ways—either make motor fuel a universal fuel such as gasoline is now, which is obviously out of the question, or give the public a mixture such that a carbureter readjustment is unnecessary. The latter can be done as follows: A mixture of gasoline and light oil can be made in such a way as to eliminate the necessity for carbureter adjustments and at the same time lower the freezing point of the mixture to the point where the fuel is perfectly safe to use in severe winter weather. Such a mixture still is a much better motor fuel than straight gasoline and has not the disadvantage above ascribed to purified light oil.

Mixing Gasoline and Rectified Light Oil

The one big thing to keep in mind when preparing this mixture for the public is the fact that a uniform mixture is a very desirable feature. The public wants a clean, water-white fuel of uniform quality. This is merely human nature. None of us, when we set out on a pleasure or business trip, want to be adjusting carbureters and tinker with a multitude of other things, which can be attributed to a fuel not uniform in mixture. We bought the fuel to drive the car and we expect that that is what it is going to do. If it does not perform its duty then good-bye—we'll buy something else.

So in the first place be fairly sure of the quality of light oil. See that it contains no acid or grit or water and that it is of good color—light oil at times shows a slight fluorescence; do not mistake this for a sign of a bad quality of fuel.

Next be sure of the grade of gasoline that is used; and I wish to say right here that if the public knew what is pawned off to them in the shape of gasoline, they would be a much wiser public, and they would appreciate more fully a carefully prepared fuel, such as is made from the benzol and toluol fractions of a light oil.

It is not my intention to knock the gasoline industry, however, any more than to stand back of the above statement.

Having a good grade of gasoline and rectified light oil, these should be measured out in proper proportions and then thoroughly mixed by some simple means of agitation. The mere pouring of one upon the other does not constitute mixing. There is enough difference in the specific gravity of the two constituents to enable them to stratify, but if once thoroughly mixed stratification will not take place. A good way to find out whether or not stratification takes place is to take samples from different elevations in the tank and run fractionations on them under similar conditions, determine the freezing points, and the specific gravity of each sample. When these results are set opposite each other a glance will tell what conditions of uniformity exists in that particular tank.

Pumps handling gasoline and rectified light oil should be completely isolated from the other pumps in the plant and the lines, too, should be laid out in such a way as to eliminate any possibility of contamination with other materials. Rectified light oil is a splendid solvent, as we know from our elementary organic chemistry and from experience, hence we must be cautious as to the packing we use in the pumps. Packing made of graphite or rubber is out of the question. A great many fiber packings are also useless because the binder is soluble in benzol and the fibers are released and allowed to pass on with the motor fuel and cause all kinds of trouble to the consumer, and trouble to the consumer is reflected in the form of intensified trouble to the manufacturer, and here again is shown how closely related to the sale of motor fuel is its manufacture.

Sale of Motor Fuel

In our case we had to establish a market for motor fuel. We sent a salesman to the large truck owners and tried to induce them to give this motor fuel a trial. At the same time a service station was fitted up and the motor fuel introduced at 25 cents per gallon—gasoline at that time selling for 27 cents. A record was kept of all truck deliveries to truck users, and the salesmen were instructed to keep in close touch with all deliveries and complaints. Because of the solvent action of benzol the carbon in the cylinders of a car is removed, and if a considerable amount had accumulated there prior to the use of motor fuel, the customer had some trouble, but as soon as all the carbon had been removed no more trouble was experienced.

Soon after the new fuel was introduced all sorts of wild stories were circulated about the awful things it would do to a motor. Anything from eating out the insides of the motor to putting out the tail lights. And right here, unless one is really optimistic, is where things become rather discouraging at times. Discouraging because of so many "fool" things that one hears. Discouraged not at all with the product you are putting on the market, but with a certain line of so-called business ethics— a long way from ethics—that some types love to indulge in. I do not wish to play here the role of a "knocker." You give a man a rope and he can use it for a good advantage or he can hang himself with it. If he works along lines of good common sense his rope will be a great help to him; if he works otherwise he will tangle himself and eventually get it around his neck.

We were fortunate enough to have a technical and mechanical staff competent enough to run down these absurd complaints. When introducing something new like this it seems always wise to run things down to the last ditch to find out whether or not a truth lies in the statement. Nine cases out of ten turn out as wild rumors. We continued running down these things until now very few are left, and motor fuel goes out day after day without anybody registering a complaint.

This company has invested in motor vehicles some hundreds of thousands of dollars and every last car

in the organization has run on motor fuel for fifteen months. We have records of some of our cars that show that the car has not even had a spark plug cleaned in more than a year. Our vehicles cover anything from motorcycles to 5-ton Pierce-Arrow trucks. Our own trucks and the public are served out of the same tank.

In closing I wish to say just a word about competition between gasoline and motor fuel. Gasoline is increasing in price and we have pretty definite information that further considerable increases in prices are to be expected within a short time. The demand for gasoline is in excess of the supply, consequently something must be found to supplement the supply of gasoline, if our most effective system of transportation is not to be seriously handicapped. Motor fuel should in this light be regarded as a staunch standby of the gasoline interests rather than a competitor, and I believe gasoline and rectified light oil mixtures should be encouraged for the economic good of the country and the scrubbing of all coal gas for light oil be generally put into practice, wherever possible in order that this by-product be put to some economic good.

PUBLICATIONS

A Manual of Gas Distribution

Editor, Walton Forstall. Cloth-bound; 8¼x6 in.; 968 pages; heavily illustrated. Published by U. G. I. Contracting Company, Philadelphia, Pa.

This is a work that cannot but establish Mr. Forstall as an authority on the subject dealt with. It is as satisfactory a contribution to American gas literature as we have ever reviewed.

The outstanding feature is the simplicity of treatment. It is conceivable even, so well helped out is the text by illustration, that a mere novice might thoroughly saturate himself with the contents of this book and step forth fairly competent, in an emergency, to handle a distributing situation. But add a familiarity with this work to years of practical distribution experience and you have a thoroughly educated man for the job.

It is by far the best book of the kind we have read. Something like it in completeness on other branches and we would hear less of that plea for a real American gas literature.

It would be difficult to set a finger on a gas man outside the manufacturing plant, and even he could read with the certainty of an excellent return on the time spent, who would not unnecessarily handicap himself by failing to study the contents of this work. Our first thought is that it is for the streets superintendent or foreman. But then we read into some of the chapters and conclude that if we were an appliance salesman we'd be inclined to believe the book was prepared especially for us, so many of the questions the salesman wants light on do we find therein answered.

The book includes groupings of chapters in sections on: Scope and organization; obtaining, ascertaining and communicating results; mains; services; main and service work; inside work; installation; maintenance; meters; forms and records; specifications for piping and fixtures; cooking appliances; water heaters; room heating appliances; industrial appliances and gas engines; The whole is treated without a mincing of words. Where gas usage is accompanied by danger unless properly applied and used, this work so states and outlines the necessary precautions.

Volume of Decisions of the Federal Trade Commission

The Federal Trade Commission has published the first volume of its Decisions, Findings, Orders and Conference Rulings. Bound copies may be obtained from the superintendent of Public Documents, Washington, D. C., for $1.50 apiece. The volume includes all cases passed on by the commission from March 16, 1915, to June 30, 1919. Subsequent volumes will follow. The printing of the volume entailed considerable expense and for that reason the commission adopted the policy of the Interstate Commerce Commission in not making general public distribution of the volume.

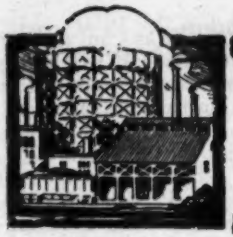
"Steptoe" Law of West Virginia Has Far-Reaching Effect on Gas

Taking of evidence in the Steptoe gas suits, now pending before the Supreme Court of the United States will commence May 1. The suits are styled the State of Ohio versus the State of West Virginia and the State of Pennsylvania versus the State of Virginia. Five months are given each side for the submission of evidence and each side has thirty days of rebuttal. It is not expected that West Virginia will use near as much time as allowed and that the case will be submitted to the highest tribunal for decision by Jan. 1, 1921.

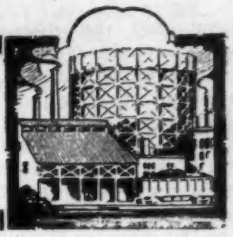
This action was taken by the neighboring States of West Virginia to test the validity of the Steptoe law recently enacted by the West Virginia Legislature which provides that all domestic needs shall be supplied before gas companies are permitted to transport gas to other States. It means that, should the law be upheld by the Supreme Court, Pennsylvania and Ohio municipalities and industries will virtually be cut off from the supply of natural gas they are now receiving from this State. The needs of West Virginia's domestic consumers and industries, it is said, are such as to require the entire production of gas wells within the State.

Experts on the gas question as it affects West Virginia assert that the entire future of the gas business and West Virginia manufacturers rests upon the decision of the Supreme Court in this case and that it is the most momentous problem that has ever come up in the history of big business in this State. These experts say that if the law is declared constitutional, it means that everything will be rosy for gas consumers in West Virginia for years to come and that they will continue to buy natural gas for fuel for from 16 to 22 cents per 1,000 cu. ft., the price varying according to proximity to the source of supply; that manufacturers will continue to flock into the State for the benefit of the cheap gas, and that some industrial consumers outside of the State will be driven out of business.

If the law is declared unconstitutional, they hold, then conditions will not be so bright for the average West Virginian and the State as a whole. It will mean that some industrial consumers will be deprived of cheap gas and the marginal producer will cease operations. It will mean a bidding between all the industrial and domestic consumers of Ohio, Pennsylvania and West Virginia, and the entire question will be a matter of supply and demand like any other product or commodity.



NEWS OF THE GAS INDUSTRY



Kings County Co. Ordered to Refund $600,000

The Appellate Division, First Department, has handed down a decision denying the application of the Kings County Lighting Company, Brooklyn, N. Y., for an injunction pending their taking an appeal from the recent decision of Justice Greenbaum upholding the 80-cent rate.

The effect of this decision of the Appellate Division is to require the company to forthwith return to the consumers over $600,000 which was impounded during the trial of the case, and which represents the difference between the 95-cent rate and the 80-cent rate.

The $600,000 will be distributed to the consumers who have been paying the raise pending the Appellate Division's decision. The decision will go in effect at once, and from now on consumers will pay only the 80-cent rate.

The $600,000 fund represents cash difference between the old and the new rates from the time the gas company first began action for an order permitting it to charge the 95-cent rate.

Fuel Situation Critical in Illinois

Illinois public utility companies are much perturbed by the fuel situation. While prices for coal have soared to new heights, due to the 27 per cent increase in miners' wages recommended in the majority report of the President's coal commission, oil for gas-making purposes has not only gone to unprecedented prices but a shortage exists that rivals that of print paper.

While co-operation of the various State commissions, as well as the Bureau of Mines and the U. S. Geological Survey, has been obtained with a view of alleviating the shortage, little relief has been obtained. No satisfactory assurance of a steady supply of oil can be found in the situation. It is said that the continually increasing demand for gasoline and the refined products of crude oil, the great extent to which fuel oil has come to be used in place of coal for steamships and the tremendous prices that Europe is paying to fill her insatiable demand have much to do with the shortage.

Gas oil has jumped in the wholesale market from 2.68 cents a gallon to 8 to 10 cents, over approximately 350 per cent, the increase being largely dependent upon the price that the utility is forced to pay in view of its immediate wants. During the railroad strike companies were paying as high as 15 cents a gallon, and even at that figure could not obtain sufficient supplies. What this tremendous increase in prices means to the utilities is shown in the fact that the Peoples Gas Light & Coke Company, of Chicago, uses 93,000,000 gal. of gas oil annually, as well as tremendous quantities of coal. Gas companies of Rock Island, East St. Louis, Springfield, Bloomington, Peoria and other cities of the State have the same situation to meet as the Chicago company.

"The seriousness of any possible interruption in the supply of artificial gas to the public," says R. B. MacDonald, vice-president of the Peoples Power Company, of Moline, "where it is so generally used for cooking, lighting and heating purposes, is causing concern on the part of those responsible for the maintenance of the gas supply. The problem both as respects oil and coal is one entirely beyond the power of either the companies or the regulatory authorities to control. Our hands are tied as respecting remedying the situation, but everything possible is being done to prevent the working of hardship upon the public."

W. M. Willett, general manager of the Western United Gas & Electric Company, of Aurora, which company serves sixty-three communities, says that the coal situation recently became so bad that gas was being made with oil hauled by truck. Coal has cost that company as high as $7.60 a ton, or several times its former price. As the Illinois utilities use in excess of 4,500,000 tons of coal per year, increased prices are of no small consequence.

$5,000,000 Issue of Pacific G. & E. Preferred Sold

Among the most conspicuous achievements of financing on the Pacific Coast since this territory became a real investment market is the sale and distribution during the past six months by the Pacific Gas & Electric Company of $5,000,000 par value of its first preferred stock. This issue was entirely closed out recently and there is at the present time no preferred stock of the company for sale.

It is only during the past ten years that such a feat of financing would have been possible. During the past decade California has been transformed from a borrowing into a lending community. The great prosperity of the basic industries of the State, her agriculture, her oil and shipping, has created a surplus which is now sufficient to take care of a great proportion of the sound and conservative new financing required for her development. Until the past few years it was necessary for corporations requiring extensive financing in order to facilitate growth and development to place the greater portion of their securities, if not all of them, in the Eastern market. This condition no longer prevails.

It is patently true that there is no more essential industry in California than the supplying of gas and electricity, and the Pacific Gas & Electric Company occupies a commanding position in this industry throughout a large part of northern California. The company supplies a total of 535,136 consumers with a commodity of daily

need and the discontinuance of which would cause great physical inconvenience and discomfort, in addition to crippling many other lines of industrial and agricultural activity. It is obvious that the State of California cannot continue to develop its tremendous natural resources and will be unable to prosper without the continuous development of the gas and electric properties in this State. The future of the Pacific Gas & Electric Company can be said to be indissolubly linked with the prosperity, growth and development of this State.

Company Asks Annulment of 95-Cent Rate

The Rochester Gas & Electric Corporation, of Rochester, N. Y., has requested the old order of the former Commission of Gas and Electricity fixing the rate for gas in Rochester, N. Y., at 95 cents a 1,000 cu. ft. be annulled by the Public Service Commission. The lighting company will then apply for a rate commensurate with the increased cost of production. The company states that carrying out the old order would give a deficit in its gas department in 1920 of $232,414.

"The old order bobbed up in January, when we applied for the right to have a service charge of 30 cents a month to each gas customer, together with a charge of 90 cents a 1,000 cu. ft. for the gas used," explained General Manager Herman Russell. "Because of this agreement back in 1907 the commission could not consider our petition for the service charge and new rate. We are now asking for a cancellation of the limitation.

"Allowed such annulment we will probably file new rates with the commission. What they would be I cannot say, but presumably they would be similar to our original request in January. Our new gas main has enabled us to give gas to our customers during the past few years of ever rising costs at the same figure, but conditions have become such that we must have more revenue."

Gas Consummation in New York City for One Day

In the twenty-four hours of Dec. 18 New York City burned 160,327,000 cu. ft. of gas, the greatest quantity ever consumed in any city in a day.

New Gas Plant for Chehalis Capitalized at $5,000,000

The United States Hydro-Carbon Gas Company, with a capital stock of $5,000,000 is to be located at Chehalis, Wash. The incorporators named in the articles, which have been filed with the secretary of State at Olympia and the Lewis County auditor, include G. W. Shultz, J. M. Rhoades and A. C. Blazo. The officers of the corporation include well known business men of Seattle, Portland, Everett and other points. I. Warring, who is general manager of the Wells-Fargo Express Company at Portland, is president; Albert A. Blazo, Seattle merchant, is vice-president, and Secretary James M. Rhoades, of the Commercial Club, Everett, is secretary.

The United States Hydro-Carbon Gas Company's plans contemplate the immediate erection at Chehalis of a big factory for the manufacture of hydro-carbon gas. G. W. Shultz is the inventor of the process for which patent has been secured. The gas is manufactured and stored in tanks. The product is said to be somewhat similar to other well-known products of its kind used in welding and in lighting of automobiles. Incidental to and a most important product in connection with the plant will be the manufacture of briquettes which can be produced from gas residue, sawdust and a binder. All raw materials will thus be utilized. The factory at Chehalis is to be the first unit of a series of factories the company plans to build. This city was selected as a location for the first one owing to its location midway between Portland and Tacoma, Wash.

N. J. Concern Buys Alabama By-Products Corporation

All the property and the business of the Birmingham (Ala.) Coke & By-Products Corporation, consisting of fifty Koppers ovens and other property used in connection therewith, have been taken over by the Alabama By-Products Corporation, a New Jersey concern, with $5,000,000 capital, $1,000,000 common stock and $4,000,000 preferred.

The fifty Koppers ovens, built for the Birmingham Coke & By-Products Corporation, were put in operation about two weeks ago. The work of constructing them began in the fall of 1918, but on account of the delays in the delivery of materials and machinery they were not completed within the fifteen months originally estimated as the length of time required to build them.

Morris W. Bush, president of the Alabama By-Products Corporation, and also of the Birmingham Coke & By-Products Corporation, made this announcement of the transfer of the property:

"The Alabama By-Products Corporation has acquired the property and business of the Birmingham Coke & By-Products Company. The Alabama By-Products Corporation will make coke, ammonium sulphate, tar and benzol, using the recently completed plant of fifty Koppers ovens of the Birmingham Coke & By-Products Company. It will also engage in other lines of industry from time to time as may seem desirable."

Mr. Bush is president of the Alabama By-Products Company, Horace Hammond and A. P. Bush are vice-presidents, and H. L. Morrow is secretary and treasurer.

The battery of ovens near Boyles, Ala., represent an investment of over $3,000,000. Their construction was begun at the instance of the Government during the war, and under the contract the Government agreed to take certain of the by-products. The signing of the armistice resulted in the cancellation of the contract shortly after construction work had begun, but Mr. Bush and his associates decided to go ahead and complete them.

Gasoline from Natural Gas

The Columbia Gas & Electric Company, of Huntington, W. Va., produced, from Jan. 1 to April 2 this year, 4,927,707 gallons of gasoline, compared with 4,842,328 gallons in 1919, an increase of 85,379 gallons. The different plants of the Columbia company obtain gasoline from natural gas by the absorption process, and the gain in production is due to the success of the company in extracting a larger percentage of the gasoline contained in the gas. For the seven days ended April 2, for example, the yield in gallons per million feet of gas passed was 282.3, against 260.8 the same week a year ago, or an improvement of 8.2 per cent and the highest extraction of any week since the plants were started three years ago.

City Will Combat Gilbert Findings Affecting New York Consolidated

Corporation Counsel O'Brien has filed objections to the findings of Special Master Abraham S. Gilbert in the Consolidated gas case that the 80-cent law was confiscatory.

Among the principal objections made is the fact that the most important decisions on rate cases have held that profits or losses of corporations must not be reckoned over a single year, as a criterion of the actual profits of the company; but that such profits or losses must be taken over a period of years, and an average profit arrived at.

The latest decision in this connection was made but a few weeks ago in the Kings County case by Judge Greenbaum of the Supreme Court, Special Term, Part IV.

In this case it was held that: "Inadequacy of return upon the capital of a public service corporation during an abnormal period is an insufficient ground for declaring unconstitutional a legislative act fixing the price of gas at 80 cents per 1,000 cu. ft.

"The Consolidated Gas Company of New York directly and through its subsidiaries does practically the entire gas and electric light and power business in the Borough of Manhattan, New York City, and in large parts of the Boroughs of the Bronx and Queens and in Westchester County, serving a present estimated population of 4,000,000. The gross revenue of the Consolidated Gas System in 1919, after eliminating intercompany transactions, was over $70,000,000, of which 85 per cent was derived from the electric business and 42 per cent from the artificial gas business.

"The figures thus far available indicate net earnings of the system in 1919 after operating expenses, taxes, etc. (including $3,058,609 for renewal and replacement reserve) of $13,643,549, or an amount over twice the annual interest on the funded and other debt of the system with the public, including that on the $25,000,000 7 per cent convertible bonds and the dividends paid to minority stock of subsidiaries.

"The purpose of the present issue of $25,000,000 5-year secured 7 per cent convertible gold bonds is to provide funds for the payment at maturity on Feb. 1, 1920, of $24,275,248.50 convertible 6 per cent debentures outstanding and for other purposes. The funded debt of the company is therefore being only slightly increased.

"The large equity over and above the $25,000,000 5-year secured 7 per cent convertible gold bonds is represented by the $100,000,000 common capital stock outstanding, on which regular dividends have been paid for thirty-five years, the present rate being 7 per cent per annum."

Gas Industry Uses 28,000,000 Barrels of Oil Annually

In common with other industries threatened by curtailment of the supply of oil and petroleum, gas companies throughout the United States are much concerned over the reduction in the supply of gas oil, one of the distillates of crude oil.

The American Gas Association says that approximately 70 per cent of the artificial gas produced in the United States is made in processes which require the annual use of about twenty-eight million barrels of gas oil.

"We are co-operating with the various State Utility Commissions, the U. S. Bureau of Mines and the U. S. Geological Survey in an endeavor to alleviate a condition which may work a serious hardship on the gas consuming public," states the association.

"In the meantime, gas companies are exercising the greatest economy in their use of gas oil. The quantity they consume is but a negligible part of the total petroleum production, but in supplying a commodity which is a recognized public necessity to over forty million people, it constitutes a demand the importance of which is second to none. Oil for the manufacture of gas thus becomes one of the necessities of life."

50 Per Cent Increase in Rates Asked by Grand Rapids Gas Company

The Grand Rapids Gas Light Company, Grand Rapids, Mich., through Emerson McMillin, chairman of the board of directors of the American Light & Traction Company, its parent company, has filed an application with the city commission for a 50 per cent increase in its gas rate beginning May 1, which if granted would mean $1.50 gas for Grand Rapids.

The company calls attention to the large increases in the cost of coal and oil, and the contemplated increases of 25 per cent in the cost of coal in the near future. Touching on the application for a rate on a temporary contract the application reads:

"The cost of gas for 1,000 cu. ft. sold in 1919, for labor and material only, was $.8731; in January, 1920, the cost was $.9688; in February, 1920, the cost was $1.013. The probable cost based on present quotations for oil and coal will be $1.08. This does not include the increases referred to as being probable in the near future.

"Estimate of cost based on present quotations: For labor and material, $1.08; depreciation fund, $.05; rate of return based on $5,000,000 valuation, $.36; total, $1.49.

"We therefore think the price to be charged should start off at $1.50 net."

WINDOW DISPLAY OF THE GRAND HAVEN (MICH.) GAS COMPANY PRESENTING GAS AS HEAT AND LIGHT

Peoples Company Ask 47 Per Cent Gas Rate Increase

The Peoples Gas Light & Coke Company, of Chicago, Ill., has petitioned for a change of rate which will amount to an increase of 47 per cent. The city will oppose the demand, says Donald Richberg, counsel for the city.

The new rate schedule the company asks is: $1.25 for the first 10,000 cu. ft., an increase of 40 cents over the present rate of 85 cents; $1.18 a thousand feet for the next 40,000 cu. ft., an increase of 38 cents over the present rate of 80 cents; 96 cents a thousand for all over 50,000 cu. ft., an increase of 31 cents over the present rate of 65 cents.

After meeting all expenses the company's earnings for 1919 were only $65,207, which was not sufficient to pay dividends, the petition points out. It is also said the 1920 pay roll will be almost $2,000,000 higher than that of 1919 and the cost of materials has greatly increased.

The rate is to be effective, if the company wins its request, commencing June 1. B. J. Mullaney, manager of the company's public relations department, said the cost of gas production from June 1 to the end of the year will be $1.2382.

The balance asked of 1.18 cents is needed, he says, to wipe out the deficit which for the full year would be more than $4,000,000.

"The gas company has been one of the great corporations operating in Chicago without profit," Mr. Mullaney said. "During the last four months our deficit has been more than half a million dollars. There is no money in the treasury to pay our taxes of $812,212.42. The company is rapidly going broke. Our stockholders have received no dividends since 1917."

But Attorney Richberg speaks from the other side of the discussion.

"While it's true that the cost of gas production has increased," he said, "it must be remembered that the gas company has been paying interest on bonds to the value of $46,000,000. Also, they have been paying interest on $12,000,000 outside of this.

"The expenses of operation include the vast interest sums. These certainly have been met, or else the company would in reality be now bankrupt.

"The proposition of the city is that there should be no adjustment of rates made on a basis of return to the stockholders until an equitable rate is established on a basis of the real value of the company and the service rendered."

Mr. Richberg says the average household gas consumption is about 3,000 cu. ft. monthly, which, under the present rate of 85 cents, is $2.60. The increase asked will mean that every gas-using family will have its monthly bills increased by $1.22.

Pavilion Natural Gas Co. Will Not Accept Ruling of Commission

Unless local manager W. M. Aiken, of the Pavilion Natural Gas Company, Le Roy, N. Y., receives instructions to the contrary, the April gas bills will go out at 85 cents a 1,000 ft., instead of 40 cents as directed by the Public Service Commission. Furthermore, all payments under protest will be refused, as the company has instructed its local managers not to accept any payments under the old rate whatsoever, nor with any "mental or financial reservations" on the new rate. In plain English you can take the gas at 85 cents or leave it alone.

Mt. Morris has secured an injunction restraining the company from issuing its April bills at 85 cents a 1,000, but thus far the company has shown no signs of being restrained by anyone and refuses to accept the ruling of the Public Service Commission.

Plymouth Gas Co. Would Increase Rates of Small Consumers

The Plymouth Gas Company, Plymouth, Mass., has petitioned for authority to change its rates thereby bringing about an increase in the price of gas. It seeks to lower the rate for those who use gas in larger quantity, while the small user would pay more. The proposed new rate would make a reduction from the $2.75 per 1,000 cu. f.t to $2 to those who use more than 2,000 ft. a month, while there would be a graduated scale for those using less than a thousand feet running as high as $8.50 per 1,000 when less than 200 ft. is used a month.

Woodhaven Gas Co. Must Extend Mains

The Woodhaven Gas Company, Queens County, N. Y., has been directed by the Public Service Commission to extend its gas mains to Springfield, Laurelton, South Jamaica Place, Locust Lane and Locust Manor.

Commissioner Lewis Nixon signed the order upon the recommendation of Deputy Commissioner Edward J. Glennon.

The resolution says in part: "The just claims of the citizens of the Fourth Ward of Queens to compel the Woodhaven Gas Company to supply gas have been fully and amply sustained, thus placing the entire population of the districts mentioned in the decision on a par with those of other wards of Queens County after a long drawn out struggle of twenty years' standing to get gas, without which the development of these districts has been forcibly repressed.

Gas Rates Advanced 13.8 Per Cent in Brockton

Gas has been advanced 13.8 per cent in price in Brockton, Mass., and towns served by the Brockton Gas Light Company, the new schedule going into effect on April 10. The increase is not a flat one, however. Instead there is what Manager George H. Priest calls "a plan whereby the cost of distribution is better equalized."

It tends to place the chief burden on the small consumer. Household consumers now pay $1.45 per 1,000 cu. ft., this being the net price, available when discounts are taken up. Under the new schedule the unit is 100 cu. ft. The first thousand cubic feet of gas costs $2.10 net, as compared with $1.45, but the second thousand cubic feet costs only $1.20, making $3.30 as the price of 2,000 cu. ft., as compared with $2.90, or an advance of 40 cents.

Minimum charge, adjusted yearly, 50 cents per month.

First 100 cu. ft., per month, $.81; discount, $.11; net price, $.70.

Next 400 cu. ft., per month, $.21; discount, $.01; net price, $.20.

Next 19,500 cu. ft., per month; $.13; discount, $.01; net price, $.12.

Next 30,000 cu. ft., per month, $.12; discount, $.01; net price, $.11.

Next 50,000 cu. ft., per month, $.11; discount, $.01; net price, $.10.

Construction Notes

Southern Public Utilities Co. to Expend $150,000 on Improvements

The addition of new equipment and extensions in its gas plant and system in Charlotte, N. C., to cost $150,000 or more, has been announced by President Z. V. Taylor, of the Southern Public Utilities Company.

Much of the new equipment was ordered several weeks ago and will arrive and be installed within the next few weeks. This equipment includes a tar extractor, which will be put in ahead of the gas purifiers and is expected to make the work of the purifier more efficient. When this tar extractor is installed the purifiers will be cleaned and renovated and will be filled with 3,600 bushels of iron oxide, the purifying material that has been proven most efficient. The purifying capacity of the plant is to be doubled.

Among other equipment which was ordered weeks ago and already shipped is a compressor, through the use of which a high pressure will be maintained. This main is already installed, but has been operated under normal pressure. Under high pressure operation it will carry about three times the volume of gas which it has heretofore accommodated.

The more recent budget calls for an increase of approximately 50 per cent in the holding capacity of the plant here, this being at present 300,000 cu. ft.

Of equal importance will be the extensions. There will be 40,000 ft., approximately eight miles, of new "feeder" lines, in which 6, 8 and 10-in. mains will be used, a number of extensions of service lines, and the replacing of several miles of small service mains with larger pipe.

The gas plant has a total manufacturing capacity of, including both coal and water gas, 2,000,000 cu. ft. a day. It is producing an average of about 65,000 ft. a day, occasionally going as high as 750,000 ft. a day. The manufacturing plant itself, without additions, will meet the requirements of the city for sometime yet, but the growth of Charlotte has been such during the last few years that the holder capacity and the capacity of the feeder lines have been outgrown to the extent that during the highest "peak" hours in some sections of the city the pressure has been lower than formerly.

The installation of the compressor and the high pressure line and the additional holder capacity ordered will relieve this situation and result in a much more even pressure, it is declared.

New Gas Generator Set for Rockford, Ill.

The Gas Machinery Company, of Cleveland, Ohio, is under contract to furnish 9-ft. water-gas generator set and auxiliary equipment in the plant of the Rockford (Ill.) Gas Light Company.

Midway Gas Co. to Build New Pipe Line

The Midway Gas Company, of Los Angeles, Cal., has secured permission from the State Railroad Commission to issue $500,000 of 7 per cent serial notes, the proceeds to be partially used in building a 60-mile pipe line from the Midway oil fields.

The Southern California Gas Company is authorized to guarantee the payment of these notes.

The completion of this pipe line will enable the Midway company to deliver to the Southern California company 10,000,000 cu. ft. of additional gas daily. The total cost of the pipe line is estimated at $900,000.

Greenville Gas Plant Will Be Greatly Enlarged

An expenditure of $150,000 will be made by the Southern Public Utilities Company in the city of Greenville, S. C., during the next six months on additions to the gas plant and extensions of the gas distribution system. This amount includes the cost of equipment recently ordered and extensions and additions already in course of construction.

Among the additions to the plant in Greenville will be a new water-gas set, new and larger purifiers, a tar extractor and the new holder which is now in course of construction and will have a capacity of approximately 250,000 cu. ft. of gas. A new building will be necessary to house the new water-gas set and other equipment.

The new extensions include a main feeder line from the new holder to that section of Greenville west of Reedy River. This line is now under construction and should be in service within thirty to sixty days. A new feeder line to the north and east sections of Greenville was constructed last summer and fall.

The enlargement of the gas plant at Greenville and the installation of new feeder lines are necessitated by the phenomenal increase in the use of gas in the city. The consumption ranges from 325,000 to 340,000 cu. ft. a day at present, this being an increase of approximately 65 per cent above the daily consumption a year ago.

The addition to the plant will give a capacity of 350,000 cu. ft. a day of coal gas and more than a million cubic feet a day of water gas. The large water-gas capacity will give Greenville insurance against a gas famine in the event that the coal-gas plant for any reason be out of commission. One water-gas set is used daily also to enrich the coal gas, which does not contain as many heat units as the water gas, which is made from oil instead of coal.

The enlarged gas plant and distributing system will give Greenville a plant that for efficiency will have no superior in the country.

United Gas & Fuel Co. Installing New Water-Gas Set

The United Gas & Fuel Company, Ltd., of Hamilton, Ont., Canada, has ordered from the Gas Machinery Company, of Cleveland, Ohio, a new 9-ft. double superheater carbureted water-gas apparatus, which will be installed alongside the 9-ft. set furnished by the Gas Machinery Company in Hamilton a few years ago, and the new set will be complete with turbo-blower and auxiliary equipment.

$50,000 Gas and Oil Company Organized

Mr. Donnelly, formerly field manager for the North Eastern Oil & Gas Company, of Ashtabula County, Ohio, and associates have organized a $50,000 company to drill a number of wells in Ashtabula County this year for gas. While Mr. Donnelly was associated with the field work of the North Eastern Oil & Gas Company he became thoroughly familiar with the geological formations of this section, and says that, in his opinion, the fields of gas in this

county have barely been touched and that he is confident that a good field will be open long before the $50,000 is expended.

Providence Gas Co. Files New Rate Schedule

President Manchester, of the Providence Gas Company, Providence, R. I., has filed with the Public Utilities Commission a proposed new schedule of gas rates for this city.

A net rate of $1.25 per 1,000 cu. ft. to users of 10,000 ft. and under, with the establishment of a 50-cent monthly service charge to replace the present 50-cent minimum charge, and permission to lower the standard of gas from the 580 B.t.u. standard at present maintained to 510 B.t.u., has been asked.

The remainder of the proposed new schedule provides for a charge of $1.15 per 1,000 cu. ft. for the next 90,000 cu. ft., and $1.05 per 1,000 for users in excess of 100,000 cu. ft.

At present the net rates are as follows: For the first 5,000 cu. ft., $1.30 per 1,000; for the next 5,000, $1.23; for the next 40,000, $1.17; for the next 75,000, $1.10; for all over 125,000, $1.04.

The cost of gas to the small user under the proposed new schedule would be as follows: Users of 1,000 cu. ft., $1.75; 2,000 cu. ft., $1.50 per 1,000; 3,000 cu. ft., $1.41 7-10 per 1,000; 4,000 cu. ft., $1.37 5-10 per 1,000; 5,000 cu. ft., $1.35 per 1,000; 6,000 cu. ft., $1.33 3-10 per 1,000; 7,000 cu. ft., $1.32 1-10 per 1,000; 8,000 cu. ft., $1.31 2-10 per 1,000; 9,000 cu. ft., $1.30 6-10 per 1,000; 10,000 cu. ft., $1.30 per 1,000.

According to President Manchester, the proposed reduction of the standard of gas is necessitated because of the jump in the price of gas oil, for which the company, he says, has just contracted to pay 15½ cents a gallon, as compared with approximately 5½ cents a gallon which it has been paying.

"To obtain the required British thermal units, gas oil must be used," Mr. Manchester said, "and while this did not make a great difference formerly, when gas oil was cheap, it is different now.

"We now not only have to pay 15½ cents a gallon for gas oil, but we are unable to get a sufficient supply of it even at this price, therefore the only logical thing to do is to reduce the standard of gas, rather than to be without gas.

"The new schedule is a long step toward distributing the burden of higher costs equitably among all our consumers."

Increased Costs of Making Gas Since 1898

The extent to which prices have increased since the 10-cents-a-dozen egg days of 1898 are revealed in figures submitted to the Public Utilities Commission by the Western United Gas & Electric Company, serving a number of communities in the Fox River District, Ill., showing the increased cost of products entering into the making of gas over that period. A comparison of some big items shows:

	1898.	1920.	Per Cent Increase.
Gas coal, ton	$ 2.95	$ 6.15	167
Pocahontas coal, ton	2.90	5.60	93
Boiler coal, ton	1.75	3.88	122
Gas oil, gallon	.026	.075	189
Steel pipe, ton	40.00	93.00	122
Cast iron pipe, ton	22.50	69.00	206
Meters, each	5.40	10.50	95
Purifying material	5.50	11.00	100

Plant and street labor, for which varying wages are paid, has increased 174 per cent since 1898, while the cost of pumping gas has jumped from 2 to 8 cents per 1,000 cu. ft., or 300 per cent. In addition to these cost increases are the big advances in the cost of new capital for extensions and maintenance.

Gas Company to Incorporate

Application has been made to the State Tax Commission of Maryland for the incorporation of the Elkton Gas Company with a capital stock of $50,000, divided into 5,000 shares at $10 per share.

The incorporators are Edward Deibert, Stanley Evans, Joseph H. Perkins and William Sterling Evans, of Elkton, and James L. Barber, of Philadelphia, who are named in the incorporation papers as directors for the first year. The new company proposes to purchase the present gas plant in Elkton, the owners of which recently notified the public service commission that they would have to go out of business.

THE NEWTON & WATERTOWN GAS COMPANY, of Newton, Mass., has asked the Public Service Commission for approval of an issue of additional capital stock of the par value of six hundred fifty thousand ($650,000) to pay for extensions of and additions to its plant and property.

Refund Guaranteed by Gas Company

The Dayton Gas Company, Dayton, Ohio, will deposit with the city $20,000 as good faith that the gas refunds for the deficiency for January of the present year will be made providing the city wins the suit now pending in the courts for the December, 1919, case, according to a contract entered into between the city of Dayton and the gas company.

George Light, manager of the local office, said that the pressure in the main line was low, and that as far as can be ascertained Dayton is not the only city suffering.

Personal Notes

NICHOLAS G. CAPUTI has been appointed superintendent of manufacture of the Grand Rapids Gas Light Company, Grand Rapids, Mich. He joined the company's forces two years ago as chemist and was soon advanced to assistant superintendent of manufacture. Before coming to Grand Rapids, Mr. Caputi was connected with the Pawtucket Gas Company and the Providence (R. I.) Gas Company.

THOMAS C. MCKENZIE, of Detroit, Mich., assistant superintendent of the corporation which operates the Citizens' Gas Company at Hannibal, Mo., is in temporary charge of the plant there, succeeding J. G. Light, resigned.

THE RAILWAY AUDIT & INSPECTION COMPANY opened an office in the Perry Payne Building, Cleveland, Ohio, April 1.

J. G. LIGHT, manager of the Citizen's Gas Company, of Hannibal, Mo., has resigned to become manager of the Sturgis Gas Company, Sturgis, Mich., and will leave in a few days to take charge of that plant.

Standard Gas & Electric Co.'s Annual Report

The Standard Gas & Electric Company, Chicago, Ill., finished the year 1919 with the largest surplus in its history, amounting to 7.7 per cent on the common stock after payment of increased preferred stock dividends, according to the annual report just issued. The earnings included in the statement, according to President H. M. Byllesby, comprise only such amounts as have actually been received by the company or are in process of collection.

Gross earnings of the public utility subsidiaries of Standard advanced to $27,158,137 from $23,344,286 during the year, and net earnings to $9,980,446 from $8,849,861. The net revenue of Standard itself was $2,960,896 for 1919, compared with $1,574,927 the previous year. After the payment of $993,781 interest charges, the balance for amortization and dividends was $1,967,115, of which preferred dividends absorbed $939,569 and amortization $65,000, leaving a surplus of $962,546, which compared with a surplus of $26,646 in 1918.

The report shows that the policy of Standard's subsidiaries of increasing their home shareholders has been successful, there having been 16,316 local sales, amounting to a total of $8,894,500, of the subsidiaries' preferred stocks during the four and one-half years ended with 1919. Local preferred stock sales for the first quarter of 1920 amounted to $2,597,600, par value.

Increased operating expenses, taxes and maintenance have had their effect in the earnings of utility subsidiaries, as shown by the following comparisons: During the years 1911 to 1917, inclusive, net earnings in the aggregate averaged 46.66 per cent of gross. Comparing this with the 1919 ratio of 36.75 per cent, and applying the difference of approximately 10 per cent to the 1919 aggregate gross earnings of $27,158,137, graphically presents the possibilities of the earning power of the subsidiaries upon a basis other than the abnormal one prevailing at this time. It is apparent that a return to pre-war operating conditions would allow your subsidiaries to materially increase the amount now distributed to their respective common stockholders, of which the Standard Gas & Electric Company in the aggregate, as is well known, is overwhelmingly the largest.

The utility subsidiaries retained in surplus or allocated to depreciation reserve $1,166,369 of earnings during 1919.

City Makes Counter-Proposal to Dallas Gas Company

A counter-proposal signifying a willingness to accept the 75-cent gas rate under "certain conditions" has been made by the Board of Commissioners in the form of a letter to the Dallas Gas Company, Dallas, Texas, in reply to the gas company's proposals of April 8.

The new rate will be granted by the city, according to the proposal, if the Lone Star Gas Company will execute its commitments or expend the sum of $750,000 in improving its gas service as specified in its letter of April 8 to the Dallas Gas Company, but if the expenditure does not result in a satisfactory supply of gas for domestic use the increase in rate shall cease or the gas company shall expend another $750,000 in the further execution of its commitments. The proposal also provides that the consumers in the city of Dallas shall not at any time ever be charged a higher rate than that paid to the Lone Star Gas Company by any other city or town supplied by that company.

This proposition is dependent upon Lone Star Gas Company's procuring lawful authority from the governing bodies of all the cities connected with its system to establish such a rate for domestic gas as will give aid to said Lone Star Gas Company, as its proportion of the sales under its existing contracts with distributing companies, not less than the sum of forty-five (45) cents per 1,000 cu. ft. for domestic use, sold and measured in the manner specified by such contracts.

THE TWIN CITIES GAS COMPANY, Strong City, Kans., brought in a well on the esse Starkey farm southeast of Elmdale, extending the field nearly a mile south. A good flow of gas was encountered at 400 ft., making it the deepest gas well in the field. The Twin Cities Gas Company supplies Cottonwood Falls and Strong City, Kans., with gas from its Elmdale field and has about a dozen producing wells.

Bars City from Gas Suit

Justice Squiers in the Supreme Court at St. George, S. I., has refused to allow the city to be made a party to the suit of the New York & Richmond Gas Company against the District Attorney of Richmond County, the Attorney-General and the Public Service Commission. The case is a test of the dollar gas bill, and is an application of the company for a different rate.

Adirondack Power Co. May Purchase Several Gas Cos.

Acquisition of the Brady interests in several towns in Warren, Washington and Saratoga Counties, N. Y., by the Schenectady Illuminating Company through the merger of the Schenectady concern with the Adirondack Power Corporation which is said to be negotiating for the purchase of gas and electric light companies in that vicinity is pending.

The companies to be taken over are the Glens Falls Gas & Electric Light Company, which furnishes gas and electricity in Glens Falls, and the United Gas, Electric Light and Power Company, of Hudson Falls, which supplies current to Hudson Falls and South Glens Falls. The negotiations with the Brady interests for the purchase of these concerns are said to be under way between the Adirondack Power Corporation and the Brady interests, but the final plans of the merger between the former concern and the Schenectady Illuminating Company have not been completed.

The Adirondack Power Corporation has its main office in Glens Falls. At Spier Falls, a few miles west of that city, it has a mammoth plant built about eighteen years ago. Its lines extend some distance west of Utica and the merger of that company with the Schenectady Illuminating Company gives the Schenectady concern a wide territory in which power will be furnished.

Gas Company Minstrels

At the Cortelyou Club, Brooklyn, N. Y., the members of the Flatbush Gas Company Employees' Association gave a military minstrel, with a chorus of sixty well-trained voices. The second half of the show was a riot of fun entitled "What's It All About?" with several scenes and many specialty numbers.

Wilkes-Barre Company Ready to Fulfill Lighting Contract

An agreement was made at a recent council meeting between Welsbach Lighting Company of America and Carroll Lighting Company, of Wilkes-Barre, Pa., whereby the latter company will start immediately to light the gas and naphtha lights of the city at a saving to the city it is said of $4,000 a year, henceforth, the Wilkes-Barre company filed a communication with the council announcing that new rates for gas are to be asked of the Public Service Commission.

The agreement reached between the Welsbach and Carroll lighting companies means that the contract entered into by the city with the Carroll company in March, 1917, for the lighting of gas and naphtha lights of the city will now be started. The Carroll company was held up during the war in carrying out its contract and recently at the suggestion of the council the company, rather than install its own posts or standards, made an effort to buy or lease the standards now in place which are owned by the Welsbach company.

Negotiations for the standards continued for several months and at the request of council, representatives of both companies attended the meeting. An understanding was reached, both parties signed the agreement and the city solicitor was instructed to notify the Welsbach company to discontinue the city lighting by May 15. Attorney Andrew Hourigan, representing the Carroll company, announced that the agreement would be taken to Harrisburg immediately for approval and that the new company would be ready to start the work of lighting by May 1. Mr. Schuler, who is in charge of the city's finances, announced that the failure of the Carroll company to take up its contract since March, 1917, has cost the city in excess of $12,000.

City Favors Plan to Mix Natural and Artificial Gas

In order to meet the demand that the Iroquois Natural Gas Company, of Buffalo, N. Y., maintain a 5-oz. natural gas pressure, the company has proposed that the city join it in making application to the Public Service Commission for authority to merge the artificial gas plant of the old Buffalo Gas Company with that of the Iroquois Natural Gas Company, to increase the supply by mixing artificial with natural gas at an estimated outlay of $3,000,000.

Mayor Buck is disposed to favor the proposed merger, subject to proper restrictions, in the interests of domestic and industrial users. "I'm in favor of a constructive policy that will relieve conditions that have become intolerable," said the Mayor, "and help in the upbuilding of the city."

City Attorney F. C. Rupp advised that the problem of natural gas shortage is solvable in two ways: First, by mixing the artificial and natural gas through the erection of a new plant, the company to get such return on its investment as the Public Service Commission may determine, along with the question of what would be proper capitalization. The new plant, he said, would take more than a year to build, Second, by restricting it to domestic use in periods of shortage.

Texas Gas Company Sold for $30,000

John T. Callahan, of Houston, Texas, has purchased from R. E. Pennington the Pennington Gas Company, at Brenham, Texas, for a consideration of $30,000.

With the closing of this deal another chapter was written in the effort to give Brenham a gas plant.

During the year of 1912 the city granted a franchise to the Brenham Gas Company and a plant was built, many Brenham citizens investing in the venture. The plant was afterwards acquired by the Southwestern Gas Company and later sold at a sheriff's sale to satisfy an indebtedness to the Security Trust Company and was bid in by the Washington Gas Company, a company composed of the bondholders of the Southwestern Gas Company.

After operating the same for a time it was sold to Mr. Pennington and he has been operating the same since that time. Increased costs of practically everything going into the making of gas has made the operation of the plant a difficult matter, but Mr. Pennington has striven to give the people good service and upon retiring from the gas business hopes that under the new management the plant will grow and continue to prosper.

THE ALBION GAS LIGHT COMPANY, of Albion, Mich., has been offered a temporary gas rate of $1.40 a 1,000 cu. ft. by the city council. Agreement has also been reached that there will be no settlement of the franchise until a permanent rate has been fixed, by agreement or by the State Utilities Commission.

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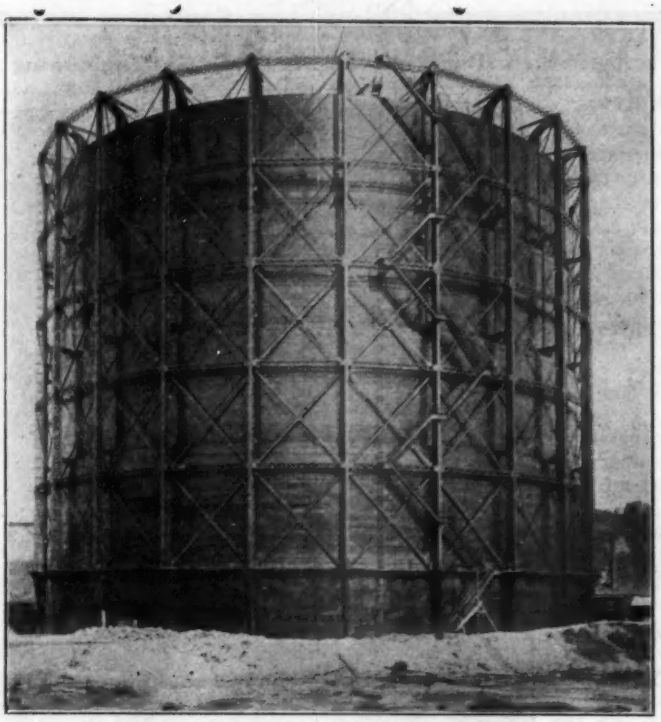

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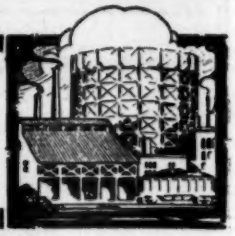


Conducted by Business Department of American Gas Engineering Journal

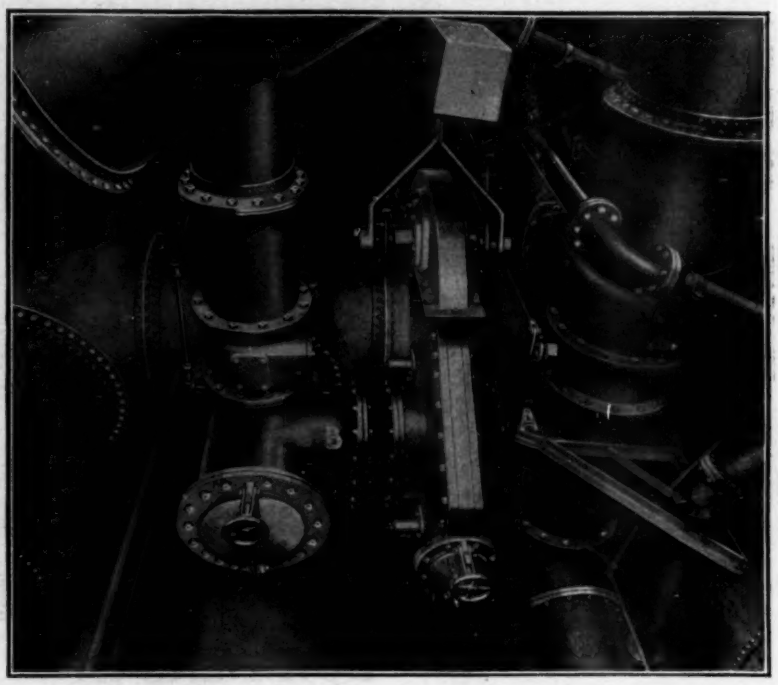
Reversing Gas Valve

"The Hot Valve That Stays Cool," is the name which has already become attached to the "Model H Reversing Gas Valve," manufactured by the Western Gas Construction Company, Fort Wayne, Ind. This new and novel type of so-called "hot valve" is shown in position in the photograph here shown, a view made in the plant of the New Orleans Gas Light Company, where it is a part of an 11-ft. "Western" Water Gas Set.

This view of the valve in actual use was made with the camera located almost directly beneath the valve.

The air blast to the generator is sent through the tee marked "A," immediately at the right of the lower portion of the reversing valve. The air blast is thus drawn in and keeps cool the valve disc which is always in the lower portion during the blasting period. The secondary air, or carbureter blast, passes through the side outlet tee, marked "B," immediately at the left of the lower portion of the valve body. Some of the air goes past the disc itself, absorbing heat from the left side, and passes up through the valve into the large opening above. This arrangement not only absorbs the heat from the valve body, but helps to thoroughly mix the secondary air with producer gas before entering the carbureter.

The Western Gas Construction Company has included this illustration with a large number of other interesting pictures in a new publication—Bulletin No. 210-D—which every man connected with a water gas plant will find to be very interesting reading.



MODEL H REVERSING GAS VALVE IN POSITION

Fluid Meter for Low Pressure Gas

The Bailey Meter Company, Cleveland, Ohio, describes the uses, range and principle of operation of the Bailey fluid meter, Type C 10, in their Bulletin No. 30. This type was developed for the measurement of coke oven gas and was first used to meter the surplus gas delivered to heating furnaces in a large steel works. It is now adapted to a number of lines of industry including by-product coke ovens, chemical industries, illuminating gas manufacture and distribution, natural gas and blast furnaces. The standard meter is designed to operate at any working pressure up to 50 lb. per square inch. A number of cross sectional drawings are given illustrating the principles of operation, also drawings and descriptions of the orifice used with the Bailey meter.

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